FILE

REMEDIAL INVESTIGATION
and
REMEDIAL ACTION WORK PLAN
for

New York Express Dry Cleaners
69-60 188th Street
Flushing, Queens, New York
Site No. V-00199-2

Submitted to:

New York State Department of Environmental Conservation
Division of Environmental Remediation
1 Hunters Point Plaza
Long Island City, New York 11101-5407

Prepared for:

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Prepared by:

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MACTEC

June 28, 2004

Shaminder Chawla
Hazardous Waste Remediation
Division of Environmental Remediation, Region 2
1 Hunter's Point Plaza
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Long Island City, NY 11101

Via Federal Express

Subject: **Remedial Investigation and Remedial Action Work Plan (revised)**
New York Express Dry Cleaners, Flushing, New York
Site No. V-00199-2
MACTEC Project No. 3485-04-0033

Dear Mr. Chawla:

On behalf of the MacArthur B Holding Company, LAW Engineering and Environmental Services, P.C. (a MACTEC Company), has enclosed the subject Remedial Investigation and Remedial Action Work Plan for the New York Express Dry Cleaners facility located in Flushing, New York. The work plan was prepared under the Voluntary Cleanup Agreement dated March 13, 2002 between the New York State Department of Environmental Conservation (NYSDEC) and MacArthur Holding B, Inc. MacArthur has applied to transfer the site from the Voluntary Cleanup Program to the Brownfields Program. The revised work plan reflects our response letters dated March 30 and May 24, 2004 and the NYSDEC comment letter dated April 29, 2004.

If you have any questions or need additional information, please do not hesitate to call us.

Sincerely,

LAW ENGINEERING AND ENVIRONMENTAL SERVICES, P.C.

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Senior Engineer

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Senior Principal Geologist

Enclosure
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EXECUTIVE SUMMARY

This Remedial Investigation and Remedial Action Work Plan (RAW) was prepared by Law Engineering and Environmental Services, P.C. (LAW) a wholly owned subsidiary of MACTEC Engineering and Consulting, Inc. (MACTEC) for the New York Express Dry Cleaners site, located at 69-60 188th Street in Flushing, Queens, New York. The location of the subject site is shown on Figure 1 in Appendix A. This RAW was prepared under the Voluntary Cleanup Agreement dated March 13, 2002, between the New York State Department of Conservation (NYSDEC) and MacArthur Holding B, Inc. (MacArthur) , Index # W2-0885-01-05. MacArthur Holding B, Inc. has applied to transfer the site from the Voluntary Cleanup Program to the Brownfields Program. If the site is accepted into the Brownfields Program, MacArthur will still implement this Work Plan. The RAW presents the conceptual design plan for installation of a proposed two recovery well Soil Vapor Extraction (SVE) remediation system designed to extract volatile organic compounds (VOCs) from the vadose zone at the site.

The subject site is an active dry cleaning facility. An out-of-service 1,250-gallon heating oil underground storage tank (UST) was previously removed from the subject site in November 1997. No oil staining or indications of free petroleum product (light non-aqueous phase liquids) were observed within the tank bed; however, evidence of solvent (tetrachloroethene or PCE) contaminated soil was detected in surrounding soils. LAW concluded that a spill or spills of PCE occurred in the vicinity of the former UST. The soils overlying the tank (immediately below the concrete sidewalk) appeared to be impacted with solvent and the residual tank fluid and wastes were primarily oily water and petroleum sludge. Due to access restrictions (building and building foundations), a portion of the impacted soils could not be removed during tank closure activities. Under the Voluntary Cleanup Plan (VCP), MacArthur proposes to address the clean up of impacted soils at the former UST area utilizing an in-situ SVE system.

SVE is a proven in-situ remedial technology used for the remediation of VOC impacted soil. SVE strips VOCs from unsaturated soil by withdrawing soil gas through a series of extraction wells that promote air-flow through contaminated zones. As air flows through the impacted region of soil, VOCs are transferred to the vapor phase and are withdrawn from the subsurface for treatment. The soil underlying the site primarily consists of medium to coarse sands, with only traces of fine gravel and silt. This soil type is generally suitable for the application of the SVE technology.

A SVE pilot test will be conducted to establish site specific design parameters that will be used for the design of the final system. The SVE pilot test will be performed in approximately one day. The pilot test methodology will consist of sequentially applying different vacuum levels to a SVE well, establishing the corresponding air flow rate, and monitoring the vacuum influence at observation wells. During the test, three air samples will be collected from the manifold, prior to vapor phase granular activated carbon (VPGAC) treatment and discharge. The air samples will be extracted using a needle syringe and then injected into evacuated glass vials. The vials will be submitted to Microseeps Laboratory for analysis of VOCs and permanent gases (oxygen, carbon dioxide, carbon monoxide, methane, and nitrogen).

LAW proposes to install a full-scale SVE system contingent upon the results of the remedial investigation and pilot test. The proposed remediation system will extract soil vapor from two or more extraction wells using a regenerative blower. The proposed pilot test will provide more accurate estimates of the vapor flow rates, vacuum influence, and carbon consumption needed for the final system design.

1.0 INTRODUCTION

This Remedial Investigation and Remedial Action Work Plan (RAW) was prepared by Law Engineering and Environmental Services, P.C. (LAW), a wholly owned subsidiary of MACTEC Engineering and Consulting, Inc. (MACTEC) for the New York Express Dry Cleaners, located at 69-60 188th Street in Flushing, Queens, New York. The location of the subject site is shown on Figure 1 in Appendix A. This RAW was prepared under the Voluntary Cleanup Agreement dated March 13, 2002, between the New York State Department of Conservation (NYSDEC) and MacArthur, Index #W2-0885-01-05. The RAW presents the conceptual design plan for installation of a Soil Vapor Extraction (SVE) remediation system for the extraction of volatile organic compounds (VOCs) from the subsurface of the site.

This RAW includes a brief summary of the project background information, remedial action objectives and goals of the SVE system, conceptual design, schedule, and SVE pilot test methodology, and operation and maintenance considerations.

2.0 PROJECT BACKGROUND

The subject site is an active dry cleaning site, the New York Express Dry Cleaners. LAW conducted a Phase I Environmental Site Assessment of the site in 1997. The New York Express Dry Cleaners was identified as a potential environmental concern due to the past and present use and storage of dry cleaning solvents.

Phase II Environmental Site Assessment

LAW's Phase II environmental site assessment was conducted in August 1997. The assessment included the advancement of soil borings, and the collection and laboratory analysis of soil samples and a groundwater sample. Soil samples were collected with a Geoprobe macro-sampler, and a hollow stem auger drill rig was utilized to bore to the water table for groundwater collection. Groundwater was encountered at approximately 40 feet below grade. The results of laboratory analysis indicated detectable concentrations of tetrachloroethene (PCE) and trichloroethene (TCE) in the soil and groundwater samples. The soil and groundwater analytical data are presented in Table 1 of Appendix B and sample locations are shown on Figure 3 of the Phase II report in Appendix B. During the Phase II activities, an apparent abandoned fuel oil underground storage tank (UST) was identified behind the subject facility.

UST System Removal

This UST system was closed (removed) in accordance with New York State Department of Environmental Conservation (NYSDEC) Petroleum Bulk Storage regulations. Confirmatory soil sampling and laboratory analysis was conducted during the tank removal consistent with the NYSDEC Spill Technology and Remediation Series (STARS) Memo #1, Petroleum Contaminated Soil Guidance Policy, in addition to laboratory analysis for halogenated compounds (USEPA Method 8240). Sample locations are indicated on Figure 4 of the Phase II report (Appendix B). The results of the analyses indicated concentrations of PCE, TCE, cis-1,2-dichloroethene, 1,1,2-trichloroethene, pyrene and 2-methylnaphthalene in the soil samples. The soil analytical data are summarized in Tables 2A and 2B (Appendix B). Based on soil conditions observed during the removal of the tank, LAW, on behalf of MacArthur, notified the NYSDEC Spills and

Remediation Division and Spills Hotline of an apparent release of PCE to the subsurface (NYSDEC Spill #97-096 84).

Fluor Daniel Investigation

Fluor Daniel GTI observed the UST removal in conjunction with LAW, and conducted a post UST removal subsurface investigation at the site. These activities are described in Fluor Daniel GTI's *Underground Storage Tank Removal And Subsurface Investigation Report*, dated December 9, 1997. LAW split confirmatory soil samples collected from the UST excavation with Fluor Daniel GTI, which submitted the samples to their laboratory for independent analysis. The results of the analyses showed the presence of chlorinated VOCs consisting of PCE, TCE, cis-1,2-dichloroethene and petroleum-related VOCs and SVOCs in the samples. These laboratory results are summarized in Appendix B in Tables 3A.1 and 3A.2.

On November 21, 1997 and November 26, 1997, Fluor Daniel GTI conducted subsurface assessment activities in the vicinity of the former UST, which included the advancement of soil borings and the collection of soil and groundwater samples. The samples were analyzed for petroleum constituents consistent with the NYSDEC STARS Memo #1 guidance policy and for chlorinated VOCs. The analytical results showed that PCE, TCE, cis-1,2-dichloroethene and petroleum-related VOCs and SVOCs were present in the soil samples. PCE, TCE, cis-1,2-dichloroethene, and petroleum-related VOCs (naphthalene and sec-butylbenzene) were also detected in the groundwater samples. These soil and groundwater analytical results are summarized in Tables 3B, 3C, 3D, and 3E. Fluor Daniel GTI's sampling locations are shown on Figure 5 (Appendix B).

Site Assessment and UST Closure Findings

The concentrations of PCE and TCE in the post-excavation confirmatory soil samples and several of the Fluor Daniel soil boring samples exceeded the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) - Determination of Soil Clean-up Objectives and Clean-up Standards. Concentrations of petroleum-related VOCs and SVOCs detected in soil samples collected by Fluor Daniel GTI exceeded the STARS Memo #1 TCLP Alternative Guidance (total concentration) Values for petroleum-impacted soils. The concentrations of PCE and TCE detected in several of the groundwater

samples from LAW's Phase II and Fluor Daniel investigations exceeded New York State Ambient Water Quality Standards and Guidance Values.

Soil Gas Survey

In an April 21, 2000 letter to LAW, the NYSDEC recommended that "a compound specific soil gas sampling program" be conducted in the basement of the dry cleaning facility. On behalf of MacArthur, LAW submitted a work plan for soil and soil gas sampling to the NYSDEC dated August 1, 2000. In a November 1, 2000 letter to LAW, the NYSDEC stated that the New York State Department of Health (NYSDOH) and the NYSDEC had reviewed the plan. They requested that the assessment include the loading dock areas at the Key Food store and that soil gas samples be analyzed in the field as well as at a NYSDOH approved laboratory. Based upon subsequent discussions between MacArthur and the NYSDEC, assessment activities were limited to the basement of the Dry Cleaners and did not include the Key Food store loading dock.

On April 10, 2001, LAW conducted field activities including soil sampling, soil gas sampling, and soil gas field screening. The results were summarized in a Report of Soil and Soil Gas Sampling letter dated July 5, 2001. PCE and TCE were detected in soil and soil gas samples collected near the apparent source area and under the basement floor slab of the dry cleaner facility, but at concentrations below TAGM Criteria.

On March 13, 2002, the NYSDEC and MacArthur Holding B, Inc. executed a Voluntary Cleanup Agreement for the remediation of the subject site.

3.0 OBJECTIVES OF THE REMEDIAL ACTION WORK PLAN

The objectives of this RAW are to perform additional remedial investigations and to present a corrective action plan to address the VOC constituents in the vadose zone in the area of the former UST excavation. The following sections describe the remedial investigation, the conceptual remedial alternative for soil remediation, and the basis for its selection.

3.1 SOIL GAS INVESTIGATION

It is LAW's understanding based on discussions during the site meeting on December 3, 2002 that the NYSDEC will not permit permanent soil vapor monitoring points in the basement of the dry cleaners due to the potential for the points to be new soil vapor exposure pathways. The NYSDEC stated that they would prefer the points be installed on the sidewalk along the north outside wall of the drycleaner. Therefore, LAW proposes to install three permanent soil vapor monitoring points (VMP-1, VMP-2 and VMP-3) through the sidewalk along the outside perimeter wall on the north side of the dry cleaners' facility. In addition, LAW will install three additional permanent vapor monitoring points to the north and west of the dry cleaning facility. VMP-4 will be installed next to the Key Food Store loading dock, VMP-5 will be located in the sidewalk just north of the former UST, and VMP-6 will be located in the driveway next to the apartments. These permanent vapor monitoring points will be utilized for all soil vapor sampling events and as monitoring points for the SVE pilot test. The soil borings will be advanced to a depth of 30 feet below grade. The borings will be completed as 1-inch diameter pre-packed wells. The wells will be screened with 20 feet of well screen installed between approximately 10 feet and 30 feet below grade. The soil vapor monitoring wells will be completed in flush-mount traffic resistant protective casings.

For the soil gas investigation, LAW proposes to collect soil gas samples from the permanent vapor monitoring points noted above, and from shallow soil gas (SG) sampling points on the north side of the dry cleaner facilities' driveway (toward the apartment buildings), adjacent to the sidewalk. These shallow sample points will be designated SG-7, SG-8, and SG-9. Temporary sampling points will be installed at a depth of approximately 2-feet below grade using a direct-push sampling system and consist of 1-inch diameter 20-slot (0.020-inch) PVC well screen, and one foot of Schedule 40 PVC riser, and finished with temporary flush mounts to grade. The samples will be collected in accordance with USEPA Soil Gas Sampling SOP #2042 using summa canisters. Soil gas will be screened with a

field instrument (such as a photoionization detector) prior to collection of the samples. One sample will be collected using a summa canister from each of three sample locations. In addition, one duplicate sample will be collected from one of the sample points. LAW will submit the summa canisters to Air Toxics, Ltd. laboratory (or approved equivalent) under chain of custody for analysis of PCE and related degradation compounds by Method TO-18. The soil gas sampling results will be summarized in the Remedial Investigation Report. Figure 4 (Appendix A) shows the proposed layout of the soil gas sampling points and vapor monitoring well points.

Additional soil gas sampling will be performed from the temporary points in conjunction with the SVE pilot test (see Section 7). The data obtained from the soil gas sampling program will be utilized to attempt to demonstrate satisfactory contaminant gas levels and / or plume control at the suspected source. If after review of the data it is determined that additional soil gas points are required to assess potential human health exposures in the Key Food Stores, LAW will evaluate options to install sub-slab monitoring points sufficient to satisfy NYSDOH and NYSDEC requirements.

LAW notes that the dry cleaner is active and currently uses PCE.

3.2 SELECTED REMEDIAL ALTERNATIVE

SVE was selected as the response action for remediating VOC constituents in the vadose zone soils in the area of the former on-site UST excavation. SVE is a proven in-situ remedial technology used for the remediation of VOC impacted soil. SVE strips VOCs from unsaturated soil by withdrawing soil gas through a series of extraction wells that promote air-flow through impacted zones. As air flows through the impacted region of soil, VOCs are transferred to the vapor phase and are withdrawn from the subsurface for treatment. The soil underlying the site consists of primarily medium to coarse sands with only traces of fine gravel and silt. This soil type is generally suitable for the application of the SVE technology.

3.3 TECHNOLOGY EVALUATION

The selection of remedial action alternatives for the development of a RAW is based on the extent of chlorinated VOC impact at the site and the evaluation of potentially feasible remedial action alternatives, such as SVE and excavation and landfill disposal of soils. In accordance with NYSDEC Technical and Administrative Guidance Memorandum (TAGM) No. 4030, the remedial alternatives identified were evaluated using the following seven criteria:

- Compliance with New York State Standards, Criteria, and Guidelines (SCGs)
- Overall Protection of Human Health and the Environment
- Reduction of Toxicity, Mobility, or Volume
- Short-Term Impacts and Effectiveness
- Long-Term Impacts and Effectiveness
- Implementability
- Cost

The selected remedial action alternative, SVE, is considered to be a feasible approach to achieve a permanent solution at the site based on the following criteria:

- Compliance with New York State SCGs - The constituents of concern associated with this site that are to be addressed by the SVE system include chlorinated VOCs such as PCE, TCE, and cis-1,2-dichloroethene (cis-DCE). SVE systems at similar types of sites have proven to be effective in removing chlorinated VOCs in the unsaturated zone to levels at or approaching New York State recommended soil cleanup objectives.

- Overall Protection of Human Health and the Environment - Any potential risk to health, safety, public welfare or the environment can be adequately controlled using SVE. Currently, the site is "capped" with impervious surfaces (i.e. the building, sidewalks, driveway, and parking lot/loading dock areas). LAW anticipates that these impervious surfaces will remain throughout the duration of the remedial design, construction, operation, and monitoring phases of the project, which will provide added protection to human health and the environment. Surfaces that are removed for construction purposes (i.e. trenching for extraction piping installation) will be replaced as part of remedial construction site restoration. It is anticipated that the future use of the property will remain as non-residential. The selection of the SVE remedial alternative to address soils containing the constituents of concern (COCs) at the Site would reduce and potentially eliminate any risk to public welfare under future uses by removing the COCs in the soil to levels at or approaching New York State recommended soil cleanup objectives.

- Reduction of Toxicity, Mobility, or Volume – The implementation of the SVE system would reduce the COCs in the vadose zone, thus reducing the volume and toxicity of the COCs in

soil. In addition, the removal of the COCs from the vadose zone soils would effectively reduce downward migration of COCs to the groundwater.

- **Short-Term/Long-Term Impacts and Effectiveness** – The SVE system would have both short- and long-term beneficial effects on the quality of the subsurface vadose zone soils in the area of concern. SVE systems have proven to be effective on similar sites with similar geologic conditions on Long Island and elsewhere.

- Implementability - SVE is easily implementable, requiring no delivery of reagents to the contaminants, and performs well in relatively homogeneous media in which the contaminants are volatile organics occurring largely as residual-phase contamination. The implementation of the selected remedial method at the Site would not necessitate land disposal, with the exception of potential disposal of soils containing COCs that are removed during trenching for extraction piping and well installation. In addition, further excavation of soils in an excavation and landfill disposal scenario is not feasible due to the proximity of the dry cleaning facility and its shallow foundation and footings to the area of impacted soils.

- Cost - The cost of implementing the selected remedial approach is not, at this time, considered to be disproportionate to the incremental benefit of risk reduction and environmental restoration.

The proposed remedial endpoints, the conceptual design details for the proposed SVE remediation system, and pilot testing of the SVE technology, are included in Sections 4.0, 5.0, and 7.0, respectively.

4.0 REMEDIAL GOALS AND SYSTEM TERMINATION CRITERIA

4.1 VOC REMEDIAL ENDPOINT

COCs were identified based on the historical soil sampling results on-site. Based upon NYSDEC guidance as outlined in TAGM No. 4064 and the Spill Technology and Remediation Series (STARS) Memo #1 Petroleum-Contaminated Soil Guidance Policy, the proposed soil concentration remedial goals are as follows:

Compound	Maximum Concentration Detected	NYSDEC STARS Alternative Guidance Value*	NYSDEC TAGM 4046 Soil Cleanup Objective
PCE	1,200,000	NA	1,400
TCE	1,200	NA	700
cis-1,2-DCE	1,620	NA	NE
1,1,2-Trichloroethane	1,780	NA	NE
Benzene	160	14	NA
Ethyl benzene	920	100	NA
Xylenes	1,200	100	NA
Isopropylbenzene	960	100	NA
N-Propylbenzene	2,200	100	NA
1,3,5-Trimethylbenzene	2,700	100	NA
Tert-Butylbenzene	2,700	100	NA
1,2,4-Trimethylbenzene	5,000	100	NA
Sec-Butylbenzene	4,700	100	NA
P-Isopropyltoluene	3,100	100	NA
N-Butylbenzene	14,000	100	NA
Naphthalene	1,600	200	NA
Acenaphthene	770	400	NA
Flourene	2,000	1000	NA
Phenanthrene	33,000	1000	NA
Fluoranthene	2,000	1000	NA
Chrysene	540	0.04**	NA
Benzo(a) Anthracene	540	0.04**	NA
Benzo(b) Fluoranthene	400	0.04**	NA
Benzo(k) Fluoranthene	420	0.04**	NA
Benzo(A) Pyrene	450	0.04**	NA

Concentrations in micrograms per kilogram, ug/kg.
NA – Not Applicable
NE – None Established
*If the STARS Alternative Guidance Value is exceeded for a compound, the sample will be submitted for the TCLP and the result compared with the STARS TCLP Extraction Guidance Value.
** When the Guidance Value or standard is below the detection limit, achieving the detection limit will be considered acceptable for meeting the Guidance Value or standard.

In accordance with the NYSDEC guidance, the total VOC concentration in soils should not exceed a maximum of 10,000 ug/kg following the system operation period.

LAW anticipates that the VOCs listed in the above table will be extracted and treated by the SVE system. In addition, the SVE system will enhance the biodegradation of the SVOCs. Methylene chloride and acetone were not included as COCs due to their presence from apparent laboratory contamination and low concentrations. However, if present at the subject site, they will be remediated using SVE with the target VOCs.

4.2 TERMINATION CRITERIA

A soil vapor sampling program will be implemented to evaluate the effectiveness of the proposed SVE system in removing VOCs from subsurface soils and to establish when to collect confirmation soil samples. Soil vapor samples will be collected during system operation from the individual extraction wells and system influent. During normal operation of the SVE system, if VOC concentrations during three consecutive sampling events are nearly equivalent or asymptotic, the SVE system will be shut down for approximately two weeks (or as deemed necessary) to allow the soil and soil vapor concentrations to equilibrate. Soil vapor samples will then be collected from each vapor extraction well and the system influent for laboratory analysis and field screening of VOC concentrations. If VOCs are present in the subsurface, it is expected that when the system is restarted, an increase ("spike") in VOC soil vapor concentrations will occur.

Concentrations of VOCs in the static soil vapor from the extraction wells and system influent will be compared to the previous levels achieved during operation of the SVE system. The system will then be restarted to resume normal operation. It is anticipated that the system will be restarted several times during the course of operation before there is a relatively small change between the extracted VOC concentrations measured during system operation and after equilibration. This cyclic operation of the SVE system will help to establish when asymptotic VOC concentrations have been reached. The asymptotic VOC levels will be evaluated to establish when to implement the confirmatory soil sampling program. The SVE system will be operated until the soil concentration remedial goals are achieved or until it is impracticable to

continue the use of the SVE system. LAW will request approval from the NYSDEC prior to permanent shutdown of the SVE system once cyclic operation of the system achieves asymptotic concentrations.

Post-remediation confirmatory sampling will be focused on areas where the highest COC concentrations were previously identified. Specifically, soil samples are anticipated to be collected from the former tank area (interval range of 4-8 feet, below the plastic underlying the backfill) and at GTI borings B-1 (12-16), B-2 (14-18) and B-3 (15-17) at which exceedances of TAGM and STARS Criteria were noted. Soil samples will be collected using a Geoprobe or hollow stem auger rig and submitted for analysis for previously detected chlorinated compounds (PCE, TCE, cis-1,2-DCE, and 1,1,2-trichloroethane) by EPA Method 8260 and STARS Table 2 VOCs (by EPA Method 8021) and SVOCs (by EPA Method 8270). If the results of the total concentrations for a sample exceeds the STARS TCLP Alternative Guidance Value, the TCLP will be performed on the sample and results compared to STARS TCLP Extraction Guidance Values.

A more detailed confirmatory soil sampling plan will be included as part of the Operation, Maintenance, and Monitoring Plan which will be submitted to the NYSDEC for approval prior to startup of the remedial system.

5.0 CONCEPTUAL DESIGN PLAN

In order to recover VOCs to achieve the proposed remedial endpoints in the area of the former tank excavation, LAW proposes a SVE system that draws vapor from two extraction wells (SVE-1 and SVE-2). A pilot test to evaluate the effectiveness, radius of influence and final design of this remedial technology is proposed and is described in further detail in Section 7.0. A process flow schematic for the proposed remediation system is shown on Figure 3 (Appendix A).

Groundwater monitoring wells will be installed and a groundwater monitoring program will be implemented to assess water quality impacts, if any, from the UST system and the SVE remediation. LAW will install six groundwater monitoring wells to a depth of approximately 49 feet bgs as shown on Figure 4. These wells will be sampled semi-annually after the initial groundwater quality assessment is completed, if the initial assessment demonstrates VOC impacts to the groundwater. Groundwater samples will be analyzed for VOCs by EPA method 8260 and results will be reported to the NYSDEC within 30 days of receipt of the laboratory report. The first semi-annual groundwater sampling event would be performed after the start of the full scale remedial system.

5.1 SVE WELL INSTALLATION

Based on the apparent size of the area of impacts and LAW's experience with sites of similar geology on Long Island, New York, LAW estimates that two extraction wells will be sufficient for the full-scale SVE system. However, the pilot test results will be evaluated and the radius of influence will be estimated to establish the actual number of wells that will be necessary for the full-scale system. If the pilot test results dictate that additional wells will be necessary for the full-scale system, those additional wells will be installed as part of remedial construction activities.

The vapor extraction wells will be installed in the test area by a New York State licensed driller using hollow stem auger (HSA) and/or Geoprobe™ drilling methods. Wells SVE-1 and SVE-2 will be installed approximately 45 feet from each other, one at the rear (west) of the dry cleaner facility and one outside the north wall of the dry cleaners, respectively. The proposed well locations are shown on

Figure 4. One extraction well (SVE-1) will be installed using HSA drilling methods. This well will be constructed of 4-inch diameter, Schedule 40 PVC, flush mounted with traffic-resistant well vaults, and utilized as the extraction well for the pilot test. Extraction well SVE-1 will be installed to a total depth of approximately 38-feet below ground surface (bgs) and screened in the interval from about 6 to 38 feet bgs, using 0.020-slot screen. The second extraction well, SVE-2, will be installed in the sidewalk along the north wall of the drycleaner's facility and utilized as an observation well for the pilot test and as a proposed extraction well for the full-scale system. Extraction well SVE-2 will also be installed to a total depth of approximately 38 feet bgs and screened in the interval from about 6 to 38 feet bgs, using 0.020-slot screen.

In addition, six soil vapor monitoring points will be installed for use with both the pilot test and full-scale system. The soil vapor monitoring wells will also be installed using HSA drilling methods. The total depth of each of these wells will be approximately 30 feet bgs and they will be screened in the interval from about 10 to 30 feet bgs, using 20-slot (0.020-inch) screen. The wells will be constructed of 1-inch diameter, Schedule 40 PVC and flush mounted with traffic-resistant well vaults. These wells will be installed at distances from approximately 10 feet to 80 feet from Extraction Well SVE-1 to measure variations in induced vacuum over distance. The configuration of the soil vapor monitoring points is shown on Figure 4.

5.2 SOIL VAPOR EXTRACTION SYSTEM

The proposed remediation system will extract soil vapor from the two proposed extraction wells using a regenerative blower. The proposed pilot test will provide estimates of the vapor flow rates, vacuum influence, and carbon consumption needed for final system design.

The proposed remediation system equipment will be housed in a locked utility shed or self-enclosed trailer at the rear (west) of the dry cleaning facility. The remediation equipment building will contain a blower, an air-water separator, two vapor treatment carbon canisters, and related electrical equipment.

Interconnecting piping from extraction wells will be placed in trenches from the wells to the remedial system equipment shed. Freeze protection of the extraction piping is not a concern because air will be the extracted media. However, the piping will be trenched to a depth sufficient for protection from overhead

traffic. Exact pipe routing and other construction details will be established as part of the remedial design following the pilot testing phase.

The vacuum influence on the extraction wells will be induced by the blower, with vapor extracted from the wells through a four-inch I.D. PVC header pipe. Soil vapor from the wells and surrounding soils will be drawn through a moisture drop-out/collection tank and in-line filter placed in the header line before the blower. Control valves and vacuum gauges will be placed at the extraction well control vaults to regulate and adjust the vacuum in each well. Vacuum gauges, pressure gauges, temperature gauges, sample ports and flow meters will also be placed at selected locations to monitor system performance.

An approximately three-horsepower blower will be installed for the full-scale system to maintain a vacuum on the wells to extract soil vapor. Air will pass through the pump and be treated prior to discharge using vapor phase carbon. The soil vapor will be treated using two vapor phase carbon vessels arranged in series and discharged to the atmosphere in accordance with the air effluent discharge permit limits. An effluent discharge permit will be obtained from the NYSDEC prior to implementation of the SVE system. The permit will be applied for after approval of this RAW and implementation of the pilot test. The final blower and carbon treatment vessels will be sized as part of the remedial design phase and will be based on the pilot test results.

Following the pilot test, equipment for the full-scale SVE system will be sized in accordance with the results of the pilot test, including number of wells, blower sizing, carbon treatment vessel sizing, and pipe sizing. Results of the pilot test will be summarized in the remedial design plan to be submitted following the performance of the pilot test.

5.3 GROUNDWATER MONITORING WELL INSTALLATION

LAW will advance and sample up to six soil borings at the Site utilizing a hollow stem auger drill rig. Based on our previous Phase II assessment, ground water in the site vicinity is encountered approximately 40 feet below grade. The soil borings will be advanced to a depth of 49 feet below grade or approximately 9 feet into the water table. The borings will be completed as 2-inch inside-diameter Schedule 40 PVC Type II ground-water monitoring wells. The well screens will be placed to intersect the water table, with 10 feet

of 20-slot PVC well screen installed between approximately 39 feet and 49 feet below grade. The ground-water monitoring wells will be completed as flush-mount wells with protective casings that are traffic-resistant. The wells will be developed upon completion by hand bailing or using a submersible pump.

5.4 IN-SITU PERMEABILITY TESTING

Slug testing will be performed on three of the newly installed ground-water monitoring wells. Slug testing will be performed by first inserting a slug test cylinder into a well so that there is a measurable rise in the water elevation. The water level is allowed to return to its pre test level while monitoring the water level equilibration rate using a pressure transducer and data logger. After the water level returns to the starting level, the second phase of the test is performed by rapidly removing the slug from the well and again monitoring the water level equilibration rate using the pressure transducer and data logger. Data collected from the slug testing of the wells will be used to approximate the hydraulic conductivity of the aquifer.

The slug tests will be performed on a day that ground water sampling is not performed to ensure that static water levels are present prior to the slug testing.

5.5 GROUND-WATER MONITORING PROGRAM

Two rounds of ground-water monitoring will be performed as part of the ground-water investigation. The ground-water monitoring will consist of one round of baseline sample collection, and one round of confirmatory sampling. The ground-water investigation will be performed to assess existing ground-water quality conditions. Ground-water samples will be collected using EPA's low-flow (minimal drawdown) procedures (Puls and Barcelona, 1996, EPA/540/S-95/504). Samples will be analyzed for VOCs by EPA Method 8260B and the following biogeochemical parameters: total and dissolved iron and manganese, ferrous iron, total organic carbon, ethene, ethane, methane, carbon dioxide, chloride, sulfate/sulfide, and nitrate/nitrite. The samples will be analyzed in the field for the following selected biogeochemical

parameters: pH, dissolved oxygen, oxidation-reduction potential (REDOX), temperature, and specific conductance. A brief description of the sampling procedures is provided below.

Water levels will be measured in all the ground-water monitoring wells prior to each ground-water monitoring event. The depth-to-water value will then be subtracted from the appropriate measuring-point elevation to calculate the water-level elevation relative to mean sea level.

Low-flow purging of each well will be conducted using a bladder pump and Teflon-lined polyethylene tubing. The depth to water will be measured during purging using an electronic water level indicator. Water will be pumped from the well at a flow rate of about 100 milliliters per minute (ml/min) to 500 ml/min; the flow rate will be monitored using a graduated beaker and watch. The pump tubing will be connected at the surface to an inline flow-through cell for measuring the following field parameters: pH, temperature, specific conductance, oxidation-reduction potential (ORP), dissolved oxygen, and turbidity. During purging, the depth to water and field parameters will be measured at five-minute intervals and recorded on ground-water sampling logs. Each well will be considered stabilized and ready to sample when field parameter values recorded over three consecutive readings are within the following ranges: pH (+/-0.1 unit), specific conductance (+/-3%), ORP potential (+/-10 millivolts [mV]), dissolved oxygen (10%), and turbidity (10%).

Water purged from the wells will be containerized in drums, which will be stored on-site, subject to the owner's approval, pending offsite disposal. We have estimated six drums may be generated.

Ground-water samples will be collected using a bladder pump and the Teflon-lined tubing at a flow rate no greater than 500 ml/min. The samples will be collected from the outlet of the tubing directly into pre-labeled bottles prepared by the laboratory. The sample bottles will be filled based on the analysis required,

in the following order: VOCs, dissolved metals, and selected biogeochemical parameters. Dissolved metals (iron and manganese) samples will be field-filtered with a 0.45-micrometer filter membrane.

The samples will be placed on ice and delivered to a New York State Department of Health-certified laboratory under chain of custody documentation. The six ground-water samples will be submitted to the laboratory for analysis of VOCs by EPA Method 8260 and STARS Table 2 VOC analytes (VOCs by EPA Method 8021) under a standard three-week turnaround.

In addition, one QA/QC field blank sample will be collected each day of sampling (maximum of two) for each sampling event, and one QA/QC trip blank will accompany the samples (maximum of two) with each sample shipment to the laboratory. The blank samples (up to four) will be analyzed for VOCs by EPA Method 8260.

The second sampling round will be performed within about one month of receipt of the final laboratory data for the first round of samples.

6.0 REMEDIAL ACTION PLAN IMPLEMENTATION SCHEDULE

A Remedial Action Plan Implementation Schedule is included as Figure 5 provided in Appendix A. This proposed schedule outlines the various tasks described in the RAW and estimated completion dates.

7.0 PILOT TEST METHODOLOGY AND SETUP

7.1 PILOT TEST DESCRIPTION AND SETUP

The SVE pilot test system will consist of one vacuum extraction well, three vacuum observation wells, a regenerative blower, one 200-pound VPGAC unit, and the necessary peripheral system components, such as piping, valves, sample ports, knockout drum, controls and instrumentation, required to perform the pilot study. A SVE process flow schematic is provided on Figure 3.

A portable, electric regenerative blower (one-horsepower, minimum), will be used for the pilot study. The blower will be capable of providing approximately 50 standard cubic feet per minute (scfm) of air at a vacuum of 20 inches of water column. A condensate collection tank will be installed in-line prior to the blower to ensure a liquid free air stream into the blower and carbon units. All electrical components and equipment will be compliant with the National Electric Code and local ordinances. It is anticipated that power for the test equipment will be obtained from the dry cleaner's distribution panel.

Four of the proposed eight vapor extraction/observation wells will be utilized for this pilot test. Refer to Section 5.1, Well Installation, for a discussion of the well descriptions and installation methodology. The SVE pilot test will be conducted after the first round of soil gas sampling. It is anticipated that the sampling event will immediately precede the start of the pilot test, as practicable.

7.2 SOIL VAPOR EXTRACTION SYSTEM

The SVE pilot test will be performed in approximately one day. The pilot test methodology will consist of sequentially applying different vacuum levels to proposed Extraction Well SVE-1, establishing the corresponding air flow rate, and monitoring the vacuum influence at the observation wells. During each of these test scenarios, the following system parameters will be observed and measured:

- Vacuum levels will be measured with a magnehelic gauge at the blower inlet, the SVE extraction wellhead, and at each of the observation wells. The readings will be collected once every 15 minutes for the first hour of the test, and hourly for the remainder of the test phase.

- Air flow measurements will be collected using a direct reading vane anemometer or a pitot tube and magnehelic gauge for the SVE extraction well. The test port or pitot tube will be installed in the PVC header before the dilution air valve. The air flow readings will be collected once every 15 minutes for the first hour of the test, and hourly for the remainder of the test phase.

- Oxygen (O_2), carbon dioxide (CO_2), and methane (CH_4) concentrations will be measured from the influent and discharge of the treatment system with a GEM-500 landfill gas meter or an equivalent meter. The readings will be collected once every 15 minutes for the first hour of the test, and hourly for the remainder of the test phase. The readings will be collected to monitor the levels of oxygen and carbon dioxide in the subsurface, which are indicators of in-situ biodegradation processes.

- The lower explosive limit (LEL) will be measured from the influent and discharge of the treatment system with an LEL meter. The readings will be collected once every 15 minutes for the first hour of the test, and hourly for the remainder of the test phase.

- Condensate build-up in the air/water separator will be monitored throughout the test.

- Temperature readings of the extracted vapor stream will be collected hourly during the pilot test.

- VOC concentrations in the effluent air from the VPGAC vessel will be monitored with a photoionization detector hourly throughout the test.

During the test, three air samples will be collected via a syringe from the VPGAC influent prior to treatment, and injected into an evacuated glass cylinder. The air samples will be submitted to Microseeps Laboratory for analysis of VOCs and permanent gases (oxygen, carbon dioxide, carbon monoxide, methane, and nitrogen). In addition, one air effluent sample (after VPGAC treatment) will be collected via summa canister, and analyzed for VOCs using MethodsTO-14 and TO-13 by an approved laboratory, in order to evaluate VPGAC treatment efficiency.

7.3 REPORTING

Following the pilot test and receipt of air sampling analytical results, a report of the pilot test results will be prepared. The report will present recommended design air flow rates, vacuums, estimated radius of influence calculations, and VPGAC sizing calculations, which will be utilized for the design of the full-scale SVE system. The report will be included as part of a remedial design plan for implementing the full-scale SVE system.

8.0 REMEDIAL SYSTEM OPERATION AND MAINTENANCE CONSIDERATIONS

After the pilot test is completed, a remedial design and operation and maintenance (O&M) plan will be developed for system start-up, long-term operations, and post-operational monitoring so that the remedial system performance is optimized.

8.1 START-UP AND LONG TERM MONITORING

The start-up phase will include approximately three days of sampling, monitoring, and manifold valving adjustments. These adjustments will be used to optimize the removal of soil vapor by concentrating vacuum pressure on the extraction well(s) producing the highest concentrations of VOC vapors. Vacuum readings and vapor concentrations will be recorded daily from each extraction well and system influent. Flow measurements at select locations and effluent vapor concentrations will also be recorded daily.

A long-term monitoring program will be initiated after activation of the treatment systems to assess the effectiveness of the system. The length of SVE system operation is estimated to be one to two years.

The SVE system will be sampled and inspected monthly by LAW field personnel to monitor the operation of the system. Additional monthly and quarterly O&M activities will include:

- Quarterly O&M for changing the air filters, blower motor oil, and change-outs of activated carbon if breakthrough occurs, or as needed per manufacturer requirements. When a carbon change-out is necessary, a subcontractor will remove the spent carbon and refill the vessels with virgin or regenerated carbon. The spent carbon will be sampled, characterized, manifested, and transported off-site by the carbon subcontractor for regeneration or disposal.

- Air samples will be collected biweekly for the first month and then monthly thereafter from the influent and analyzed for VOCs.

- The carbon mid-fluent air samples from the two sequential activated carbon vessels used to treat emissions will be collected biweekly for the first month and monitored monthly thereafter with a photoionization detector (PID).

- Carbon effluent air samples will be collected and analyzed for VOC constituents biweekly for the first month and as required by the air permit thereafter.

- Extraction well monitoring, including air flow vacuum, total VOC concentrations with a PID, and oxygen and carbon dioxide measurements with a direct-reading field instrument will be conducted biweekly for the first month and monthly thereafter.

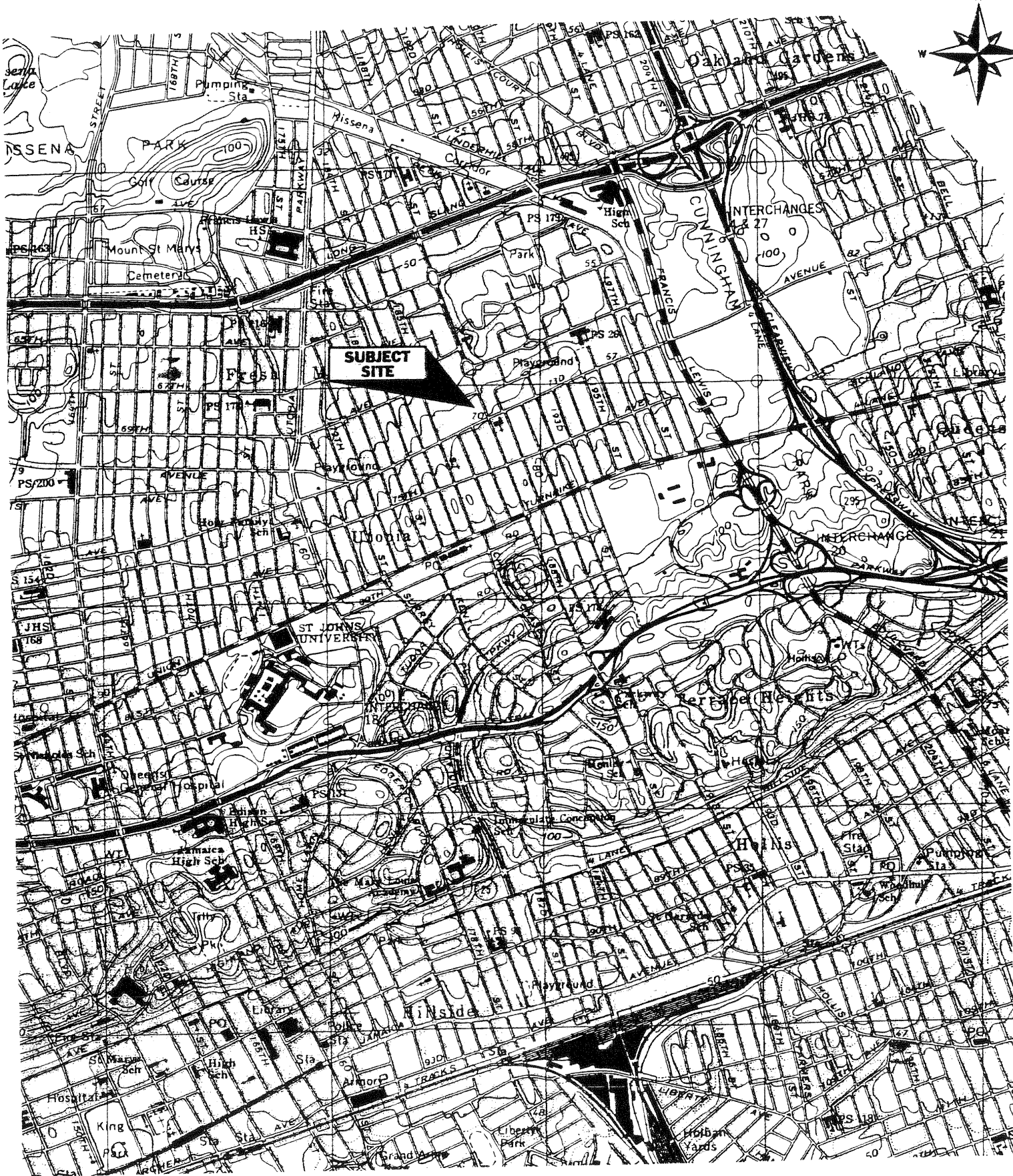
- Vacuum measurements at soil vapor monitoring wells will be collected monthly for the first quarter and quarterly thereafter.

- Post operational monitoring will include soil and soil gas sampling.

8.2 REPORTING

Progress reports will be prepared on a bi-monthly basis. These reports will be submitted to the NYSDEC on the 10th day of the month. The monitoring program for the system will be re-evaluated quarterly to assess the effectiveness of the remediation system.

APPENDIX A
FIGURES



SOURCE: USGS 7.5 TOPOGRAPHIC QUADRANGLE FOR JAMAICA, NEW YORK, 1994.

0 2000 4000

SCALE 1"=2000'

NY EXPRESS DRY CLEANERS

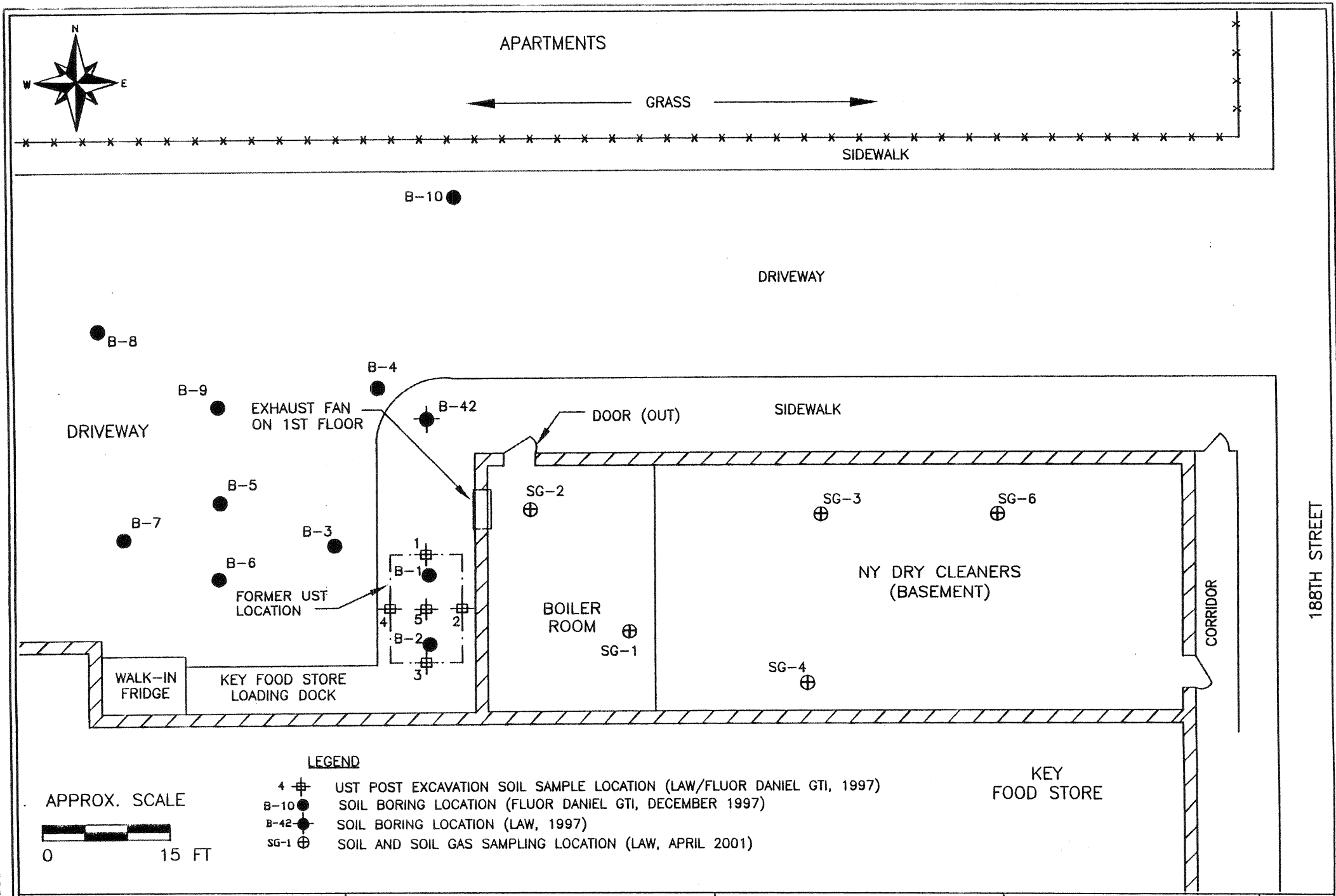
69-60 188th Street
Fresh Meadows
Queens, New York

LAW

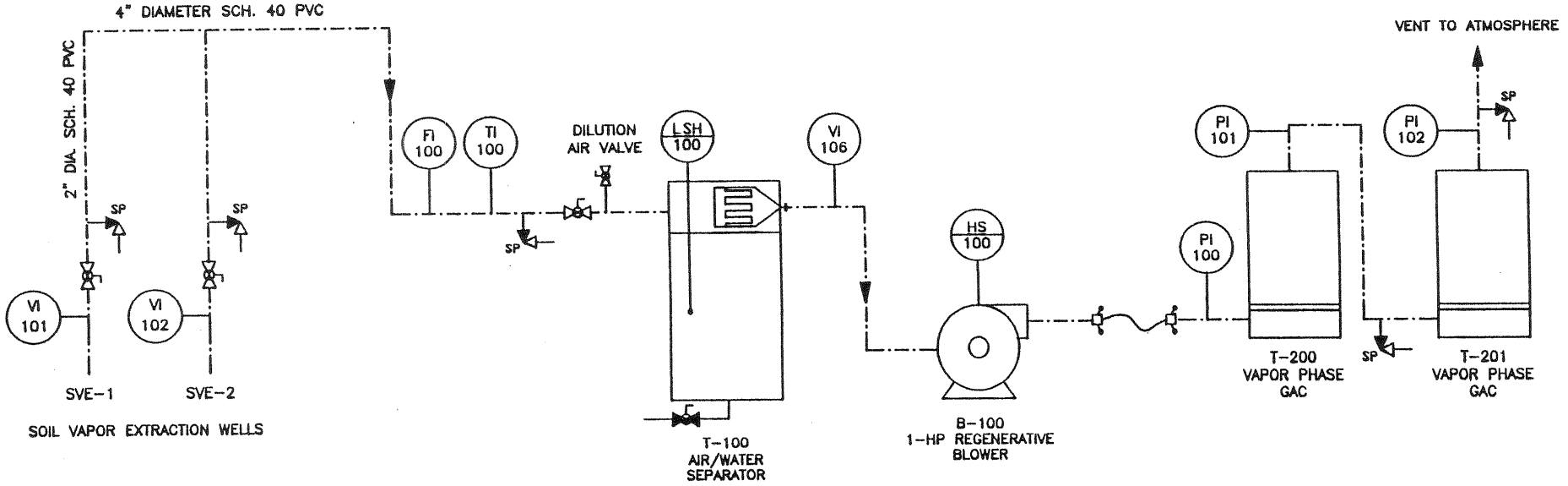
Law Engineering & Environmental Services, P.C.
3 Corporate Plaza, Washington Avenue Ext.
Albany, New York 12203

SITE LOCATION AND TOPOGRAPHIC MAP

PROJECT: 20800-2-0034
PREPARED: AKG FIGURE 1
CHECKED: BRC DATE: 4/12/02



PROJECT: 20800-2-0034 PREPARED: AKG CHECKED: BRC DATE: 4-23-02	LAW Law Engineering & Environmental Services, P.C. 3 Corporate Plaza, Washington Avenue Ext. Albany, New York 12203	NY EXPRESS DRY CLEANERS 69-60 188th Street Fresh Meadows Queens, New York	SITE LAYOUT AND VICINITY	FIGURE 2



LEGEND					
HS	HAND SWITCH	FI	FLOW INDICATOR / METER		FLEXIBLE HOSE
LS	LEVEL SWITCH	H	HIGH		AIR LINE
PI	PRESSURE INDICATOR	TI	TEMPERATURE INDICATOR		GATE VALVE
VI	VACUUM INDICATOR	SP	SAMPLE PORT		QUICK DISCONNECT FITTING

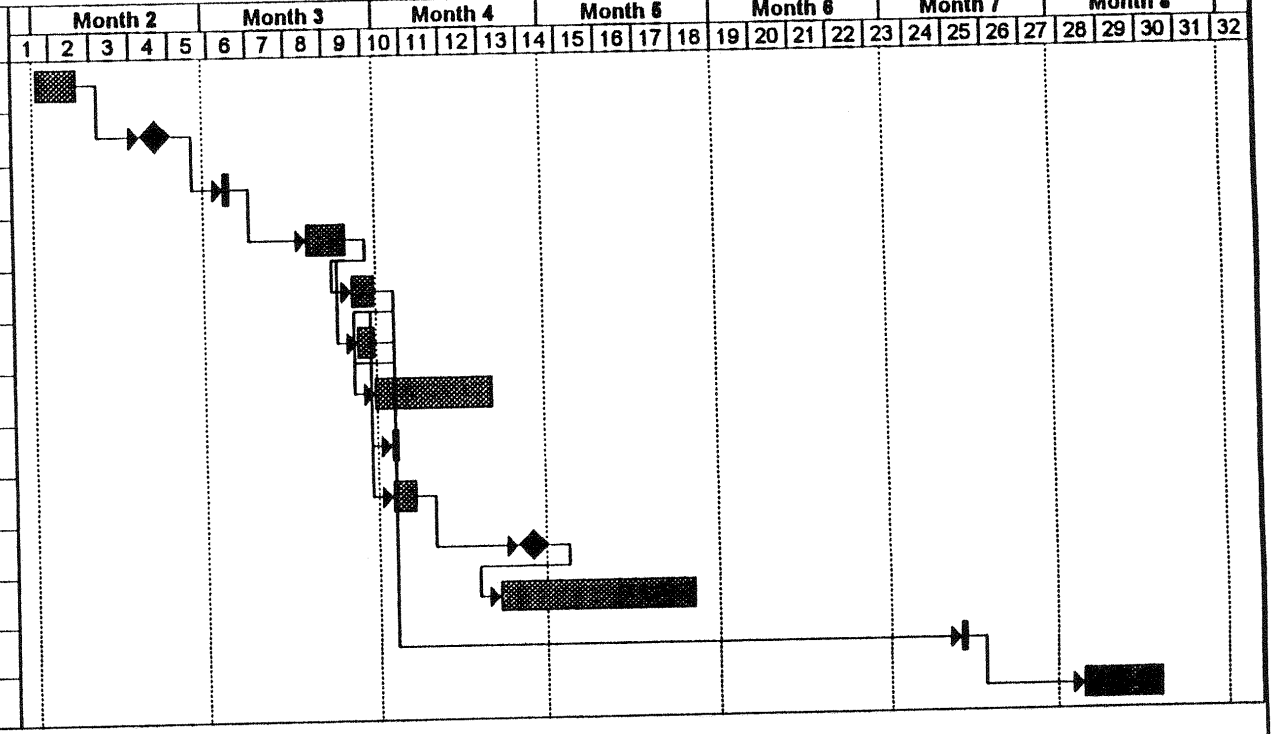
NO SCALE

PROJECT: 20800-2-0034 PREPARED: AKG CHECKED: BRC DATE: 4-12-02	LAW Law Engineering & Environmental Services, P.C. 3 Corporate Plaza, Washington Avenue Ext. Albany, New York 12203	NY EXPRESS DRY CLEANERS 69-60 188th Street Fresh Meadows Queens, New York	SOIL VAPOR EXTRACTION PROCESS FLOW SCHEMATIC	FIGURE 3

New York Express Dry Cleaners / Remedial Action Work Plan
MACTEC Project No. 20800-2-0034

PROPOSED REMEDIAL INVESTIGATION WORK PLAN IMPLIMENTATION SCHEDULE

ID	Task Name
1	Task 1.1 Prepare and Submit Response to NYSDEC Comments
2	Task 1.2 Prepare and Submit revised RAW
3	Task 2. Soil Gas Sampling
4	Task 3. Well Installation Activities
5	Task 4.1 Baseline Groundwater Sampling
6	Task 4.2 Slug Testing
7	Task 4.3 Characterization/Disposal of Soil cuttings & Purge Water
8	Task 5.2 Soil Vapor Sampling fo Permanent Points
9	Task 5.2 Perform Pilot Test
10	Task 5.3 Reciept of Analytical Datsa
11	Task 6.1 Preparation of Remedial Investigative/ Pilot Test report
12	Task 6.2 Quarterly Ground-Water Sampling
13	Task 6.3 Quarterly Ground-Water Summary Report Preparation



MacArthur Proposal Schedule

Task
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress

FIGURE 5

APPENDIX B

Tables and Figures from *Work Plan for Removal Action to Address Soil and Investigate Groundwater Contamination*, dated August 25, 1998

TABLES

TABLE 1
LABORATORY ANALYSIS OF SOIL SAMPLES
VOLATILE ORGANIC COMPOUNDS
(EPA METHOD 8240)
August 7, 1997 and September 12, 1997

Boring	Total Depth (ft.)	Sample Depth (ft.)	Methylene Chloride (ug/Kg)	Tetrachloroethene (ug/Kg)
B-20	15	12-15	ND	ND
B-21	19.5	15-19.5	5.9	ND
B-42	45	42-44	28	ND
NYSDEC Recommended Clean-up Objective (TAGM 4046)			100	1,400

Prepared by: KC
Checked by:

Notes:

ug/Kg = micrograms per Kilogram or parts per billion (ppb)
ND = Not Detected above method detection limit
Total Depth denotes feet below grade
Tetrachloroethene is also known as perchloroethene

LABORATORY ANALYSIS OF GROUND-WATER SAMPLES
VOLATILE ORGANIC COMPOUNDS
(EPA METHOD 8240)
August 7, 1997 and September 11 and 12, 1997

Boring No.	Chloroform (ug/L)	Trichloroethene (ug/L)	Tetrachloroethene (ug/L)
B-42	ND	14	160

Prepared by: KC
Checked by:

Notes:

ug/L = micrograms per Liter or parts per billion (ppb)
ND = Not Detected above method detection limit
NYDEC Class GA Ground-water Standard for chloroform: 7 ug/L (ppb equivalent), trichloroethene: 5 ppb, and tetrachloroethene: 5 ppb.
Tetrachloroethene is also known as perchloroethene

TABLE 2A
LABORATORY ANALYSIS OF SOIL SAMPLES
VOLATILE ORGANIC COMPOUNDS
(EPA METHOD 8240)
November 20, 1997

Sample	cis-1,2-Dichloroethene (ug/Kg)	1,1,2-Trichloroethane (ug/Kg)	Trichloroethene (ug/Kg)	Tetrachloro-ethene (ug/Kg)
North Wall	ND	ND	ND	846,000
South Wall	ND	690	ND	23,100
East Wall	151	385	232	11,200
West Wall	1,260	1,780	1,200	67,900
Bottom Sample	ND	ND	ND	90,300

Prepared by: KC
Checked by: [signature]

Notes:

Tetrachloroethene is also known as perchloroethene
ug/kg = micrograms per Kilogram or parts per billion (ppb)
ND = Not Detected above method detection limit
NYDEC Recommended Soil Clean-up Objective: Trichloroethene: 700 ug/Kg
Tetrachloroethene: 1,400 ug/Kg
cis-1,2-Dichloroethene: not established
1,1,2-Trichloroethane: not established

TABLE 2B
LABORATORY ANALYSIS OF SOIL SAMPLES
NYSDEC STARS TABLE 2 ANALYTES
AND ADDITIONAL VOCs AND SVOCs
(VOCs by EPA METHOD 8021 + MTBE and SVOCs by EPA Method 8270)
November 20, 1997

ug/Kg

	TCLP Alternative Guidance Value[1]	NORTH WALL ug/Kg	SOUTH WALL ug/Kg	EAST WALL ug/Kg	WEST WALL ug/Kg	BOTTOM SAMPLE ug/Kg
VOCs						
Benzene	14	ND	ND	ND	ND	ND
Ethylbenzene	100	ND	ND	ND	ND	ND
Toluene	100	ND	ND	ND	ND	ND
o-Xylene	100	ND	ND	ND	ND	ND
m+p-Xylene	100	ND	ND	ND	ND	ND
Isopropylbenzene	100	ND	ND	ND	ND	ND
n-Propylbenzene	100	ND	ND	ND	ND	ND
p-Isopropyltoluene	100	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	100	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	100	ND	ND	ND	ND	ND
n-Butylbenzene	100	ND	ND	ND	ND	ND
sec-Butylbenzene	100	ND	ND	ND	ND	ND
Naphthalene[2]	200	ND	ND	ND	ND	ND
t-Butylbenzene	100	ND	ND	ND	ND	ND
Tetrachloroethene	NA	614,000	22,200	12,100	66,800	115,000
cis-1,2-Dichloroethene	NA	ND	ND	ND	1,620	ND
SVOCs						
Naphthalene[2]	200	ND	ND	ND	ND	ND
Acenaphthylene	NA	ND	ND	ND	ND	ND
Acenaphthene	400	ND	ND	ND	ND	ND
Fluorene	1,000	ND	ND	ND	ND	ND
Phenanthrene	1,000	ND	ND	ND	ND	ND
Anthracene	1,000	ND	ND	ND	ND	ND
Fluoranthene	1,000	ND	ND	ND	ND	ND
Pyrene	1,000	ND	ND	540	ND	ND
Benzo(a)anthracene	0.04[3]	ND	ND	ND	ND	ND
Chrysene	0.04	ND	ND	ND	ND	ND
Benzo(b)fluoranthene	0.04	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	0.04	ND	ND	ND	ND	ND
Benzo(a)pyrene	0.04	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	0.04	ND	ND	ND	ND	ND
Dibenz(a,h)anthracene	1,000	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	0.04	ND	ND	ND	ND	ND
2-Methylnaphthalene	NA	ND	ND	738	ND	ND

ND = not detected
NA = not applicable (no standard established)
Bold = Exceeds TCLP Alternative Guidance Value

[1] from NYSDEC STARS Table 2: Guidance Values for Fuel Oil Contaminated Soil
[2] For napthalene analysis in a solid matrix, Method 8021 is preferred over Method 8270
[3] When the Guidance Value or standard is below the detection limit, achieving the detection limit will be considered acceptable for meeting the Guidance Value or standard.

Prepared By: KC
Checked By: KWS

Table 1 - VOLATILE ORGANIC COMPOUNDS - SOIL DATA SUMMARY

FEDERAL REALTY

NEW YORK DRY CLEANING EXPRESS - UST REMOVAL ENDPOINT SAMPLES

			SAMPLE LOCATION (all results in ug/kg)				
PARAMETER	NYSDEC STARS Alternative Guidance Value*	NYSDEC TAGM 4046 Soil Cleanup Objective**	Bottom-5.5'	North-4.5'	South-4.5'	East-4.5'	West-4.5'
Vinyl Chloride	NA	200	<50	<100	<3	<50	<50
1,1-Dichloroethene	NA	400	<50	<100	<3	<50	<50
Trans-1,2-Dichloroethene	NA	300	<50	<100	<3	<50	<50
1,1-Dichloroethane	NA	200	<50	<100	<3	<50	<50
Cis-1,2-Dichloroethene	NA	250	<50	<100	100	<50	<50
1,1,1-Trichloroethane	NA	800	<50	<100	<3	<50	<50
1,2-Dichloroethane	NA	100	<50	<100	<3	<50	<50
Trichloroethene	NA	700	<50	<100	51	<50	<50
1,1,2-Trichloroethane	NA	NA	<50	<100	<3	<50	<50
Tetrachloroethene	NA	1400	21000	1200000	2600	4200	7200
Benzene	14	60	110	160	<3	140	120
Toluene	100	1500	67	<100	<3	100	65
Ethylbenzene	100	5500	<50	210	3	<50	<50
1,3-Xylene	100	1200	260	<100	3	110	<50
1,4-Xylene	100	1200	-	<100	-	-	<50
1,2-Xylene	100	1200	180	540	4	<50	<50
Isopropylbenzene	100	NA	240	210	4	<50	<50
N-Propylbenzene	100	NA	340	1000	7	<50	<50
1,3,5-Trimethylbenzene	100	NA	410	<100	5	<50	<50
Tert-Butylbenzene	100	NA	780	2100	5	<50	<50
1,2,4-Trimethylbenzene	100	NA	1100	400	8	<50	<50
Sec-Butylbenzene	100	NA	1300	1100	12	<50	<50
P-Isopropyltoluene	100	NA	1200	440	5	<50	<50
N-Butylbenzene	100	NA	2500	3200	27	<50	<50
Naphthalene	200	NA	630	3500	19	<50	<50
Total Xylenes	100	1200	440	540	7	110	<50
Methyl Tert Butyl Ether	1000	NA	<50	<100	<3	<50	<50
PID Reading of Sample (ppmv)			440	341	4.2	16	239

* - New York State Department of Environmental Conservation Spill Technology and Remediation Series Table 2

** - New York State Department of Environmental Conservation Technical and Administrative Guidance Memorandum 4046, June 1995

J - Estimated Value

D - Diluted

NA - Not Applicable

FLUOR DANIEL

Source: Fluor Daniel GTI – Underground Storage Tank Removal and Subsurface Investigation Report, dated December 9, 1997		UST Removal Samples Volatile Organic Compounds Soil Data Summary
New York Dry Cleaning Express 69-60 188th Street Fresh Meadows Queens, NY	**LAW** Environmental Consultants, Inc.	Prepared Date: 8/21/98 Checked Date: 11/18 Project 20700-8-8051 Table 3A.1

Table 1 Continued - BASE NEUTRALS - SOIL DATA SUMMARY

FEDERAL REALTY
NEW YORK DRY CLEANING EXPRESS - UST REMOVAL ENDPOINT SAMPLES

			SAMPLE LOCATION (all results in ug/kg)				
PARAMETER	NYSDEC STARS Alternative Guidance Value*	NYSDEC TAGM 4046 Soil Cleanup Objective**	Bottom-5.5'	North-4.5'	South-4.5'	East-4.5'	West-4.5'
Naphthalene	200	13000	340J	<360	<380	<370	<380
Acenaphthene	400	50000	460	<360	<380	<370	<380
Fluorene	1000	50000	840	<360	<380	<370	<380
Phenanthrene	1000	50000	570	<360	50J	<370	<380
Anthracene	1000	50000	<380	<360	<380	<370	<380
Fluoranthene	1000	50000	110J	<360	<380	140J	<380
Pyrene	1000	50000	150J	<360	<380	140J	<380
Chrysene	0.04	400	90J	<360	<380	160J	<380
Benzo (a) Anthracene	0.04	224	60J	<360	<380	130J	<380
Benzo (b) Fluoranthene	0.04	224	110J	<360	50J	140J	<380
Benzo (k) Fluoranthene	0.04	224	100J	<360	<380	140J	<380
Benzo (A) Pyrene	0.04	61	100J	<360	<380	150J	<380
Indeno (1,2,3-C,D) Pyrene	0.04	3200	110J	<360	50J	130J	<380
Dibenzo (A,H) Anthracene	1000	14	<380	<360	<380	<370	<380
Benzo (G,H,I) Perylene	0.04	50000	130J	<360	110J	160J	<380

* - New York State Department of Environmental Conservation Spill Technology and Remediation Series Table 2
** - New York State Department of Environmental Conservation Technical and Administrative Guidance Memorandum 4046, June
J - Estimated Value
D - Diluted
NA - Not Applicable

FLUOR DANIEL

Source: Fluor Daniel GTI – Underground Storage Tank Removal and Subsurface Investigation Report, dated December 9, 1997		UST Removal Samples Base Neutrals Soil Data Summary
New York Dry Cleaning Express 69-60 188th Street Fresh Meadows Queens, NY	LAW Environmental Consultants, Inc.	Prepared Date: 8/21/98 Checked Date: fwj Project 20700-8-8051 Table 3A.2

TABLE 3B
VOLATILE ORGANIC COMPOUNDS (ug/kg)
SOIL SAMPLES
NEW YORK DRY CLEANING EXPRESS

	STARS *	TAGM 4046 **	B-1 12'-16' ug/kg	B-1 29'-31' ug/kg	B-2 14'-18' ug/kg	B-2 19'-21' ug/kg	B-3 15'-17' ug/kg	B-3 30'-32' ug/kg	B-4 13'-17' ug/kg	B-4 29'-31' ug/kg
PARAMETER										
Vinyl Chloride	NA	200	<50	<1	<50	<1	<3	<1	<1	<1
1,1-Dichloroethene	NA	400	<50	<1	<50	<1	<3	<1	<1	<1
Trans-1,2-Dichloroethene	NA	300	<50	<1	<50	<1	<3	<1	<1	<1
1,1-Dichloroethene	NA	200	<50	<1	<50	<1	<3	<1	<1	<1
Cis-1,2-Dichloroethene	NA	250	<50	<1	<50	<1	130	<1	<1	<1
1,1,1-Trichloroethane	NA	800	<50	<1	<50	<1	<3	<1	<1	<1
1,2-Dichloroethane	NA	100	<50	<1	<50	<1	<3	<1	<1	<1
Trichloroethene	NA	700	<50	<1	<50	<1	190	<1	<1	<1
1,1,2-Trichloroethane	NA	NA	<50	<1	<50	<1	<3	<1	<1	<1
Tetrachloroethene	NA	1400	6300	28	23000	29	3000	11	6	9
Benzene	14	60	110	<1	120	<1	<3	<1	<1	<1
Toluene	100	1500	59	1	77	1	<3	<1	<1	<1
Ethylbenzene	100	5500	230	<1	920	<1	<3	<1	<1	<1
1,3-Xylene	100	1200	73	1	820	1	<3	<1	<1	<1
1,4-Xylene	100	1200					<3	<1	<1	<1
1,2-Xylene	100	1200	420	1	1200	1	<3	<1	<1	<1
Isopropylbenzene	100	NA	480	<1	960	<1	<3	<1	<1	<1
N-Propylbenzene	100	NA	1000	<1	2200	2	<3	<1	<1	<1
1,3,5-Trimethylbenzene	100	NA	360	<1	2700	2	<3	<1	<1	<1
Tert-Butylbenzene	100	NA	460	<1	2700	1	<3	<1	<1	<1
1,2,4-Trimethylbenzene	100	NA	1600	<1	5000	4	<3	<1	<1	<1
Sec-Butylbenzene	100	NA	910	<1	4700	2	<3	<1	<1	<1
P-Isopropyltoluene	100	NA	860	<1	3100	1	<3	<1	<1	<1
N-Butylbenzene	100	NA	5300	<1	14000	20	<3	<1	<1	<1
Naphthalene	200	NA	3000	<1	2100	16	<3	<1	<1	<1
Total Xylenes	100	1200	493	2	2020	2	<3	<1	<1	<1
Methyl Tert Butyl Ether	1000	NA	<50	<1	<50	<1	<3	<1	<1	<1
PID Reading of Sample (ppmy)			590	28.2	570	147	12.2	8.1	52.4	11.2

Source: FLUOR DANIEL GTI – UST REMOVAL AND SUBSURFACE INVESTIGATION REPORT, DATED DECEMBER 9, 1997

ug/kg = micrograms per Kilogram

NA = not applicable

* - NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION SPILL TECHNOLOGY AND REMEDIATION SERIES TABLE 2 TCLP ALTERNATIVE GUIDANCE VALUES

** - NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION TECHNICAL AND ADMINISTRATIVE GUIDANCE MEMORANDUM 4046, JUNE 1995, SOIL CLEAN-UP OBJECTIVES

Prepared By: RH
Checked By: KC

TABLE 3B (CONTINUED)
VOLATILE ORGANIC COMPOUNDS (ug/kg)
SOIL SAMPLES
NEW YORK DRY CLEANING EXPRESS

	B-5 25'-27' ug/kg	B-6 20'-22' ug/kg	B-7 19'-21' ug/kg	B-9 21'-23' ug/kg	B-10 20'-24' ug/kg
PARAMETER					
Vinyl Chloride	<2	<2	<1	<1	<1
1,1-Dichloroethene	<2	<2	<1	<1	<1
Trans-1,2-Dichloroethene	<2	<2	<1	<1	<1
1,1-Dichloroethene	<2	<2	<1	<1	<1
Cis-1,2-Dichloroethene	<2	<2	6	66	<1
1,1,1-Trichloroethane	<2	<2	<1	<1	<1
1,2-Dichloroethane	<2	<2	<1	<1	<1
Trichloroethene	<2	<2	14	23	1
1,1,2-Trichloroethane	<2	<2	<1	<1	<1
Tetrachloroethene	13	14	140	97	26
Benzene	<2	<2	<1	<1	<1
Toluene	<2	<2	<1	<1	1
Ethylbenzene	<2	<2	<1	<1	<1
1,3-Xylene	<2	<2	<1	<1	<1
1,4-Xylene	<2	<2	<1	<1	<1
1,2-Xylene	<2	<2	<1	<1	<1
Isopropylbenzene	<2	<2	<1	<1	<1
N-Propylbenzene	<2	<2	<1	<1	<1
1,3,5-Trimethylbenzene	<2	<2	<1	<1	<1
Tert-Butylbenzene	<2	<2	<1	<1	<1
1,2,4-Trimethylbenzene	<2	<2	<1	<1	<1
Sec-Butylbenzene	<2	<2	<1	<1	<1
P-Isopropyltoluene	<2	<2	<1	<1	<1
N-Butylbenzene	<2	<2	<1	<1	<1
Naphthalene	<2	<2	<1	<1	<1
Total Xylenes	<2	<2	<1	<1	<2
Methyl Tert Butyl Ether	<2	<2	<1	<1	<1
PID Reading of Sample (ppmy)	22.2	21.4	7.2	10.9	17.1

Source: FLUOR DANIEL GTI – UST REMOVAL AND SUBSURFACE INVESTIGATION REPORT, DATED DECEMBER 9, 1997

NA = not applicable

Prepared By: RH
Checked By: KC

TABLE 3C
BASE NEUTRALS (ug/kg)
SOIL SAMPLES
NEW YORK DRY CLEANING EXPRESS

PARAMETER	STARS *	TAGM 4046 **	B-1 12'-16' ug/kg	B-1 29'-31' ug/kg	B-2 14'-18' ug/kg	B-2 19'-21' ug/kg	B-3 15'-17' ug/kg	B-3 30'-32' ug/kg	B-4 13'-17' ug/kg	B-4 29'-31' ug/kg
Naphthalene	200	13000	1600	<340	1200JD	<340	<360	<350	<350	<340
Acenaphthene	400	50000	770	<340	<1800	<340	<360	<350	<350	<340
Fluorene	1000	50000	2000	<340	4100D	<340	<360	<350	<350	<340
Phenanthene	1000	50000	33000	<340	3100D	60J	<360	<350	<350	<340
Anthracene	1000	50000	690	<340	<1800	<340	>360	<350	<350	<340
Fluoranthene	1000	50000	2000	<340	870JD	40J	70J	<350	<350	<340
Pyrene	1000	50000	820	<340	680JD	40J	80J	<350	<350	<340
Chrysene	0.04	400	540	<340	310JD	<340	70J	<350	<350	<340
Benzo (a) Anthracene	0.04	224	540	<340	280JD	<340	50J	<350	<350	<340
Benzo (b) Fluoranthene	0.04	224	400	<340	200JD	<340	70J	<350	<350	<340
Benzo (k) Fluoranthene	0.04	224	420	<340	180JD	<340	60J	<350	<350	<340
Benzo (A) Pyrene	0.04	61	450	<340	<1800	<340	60J	<350	<350	<340
Indeno (1,2,3-C,D) Pyrene	0.04	3200	210J	<340	<1800	<340	<360	<350	<350	<340
Dideno (A,H) Anthracene	1000	14	<350	<340	<1800	<340	<360	<350	<350	<340
Benzo (G,H,I) Perylene	0.04	50000	190J	<340	<1800	<340	<360	<350	<350	<340

Source: FLUOR DANIEL GTI – UST REMOVAL AND SUBSURFACE INVESTIGATION REPORT, DATED DECEMBER 9, 1997

ug/kg = micrograms per Kilogram
NA = not applicable
J = Estimated Value
D = Diluted

* - NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION SPILL TECHNOLOGY AND REMEDIATION SERIES TABLE 2 TCLP ALTERNATIVE GUIDANCE VALUES
** - NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION TECHNICAL AND ADMINISTRATIVE GUIDANCE MEMORANDUM 4046, JUNE 1995, SOIL CLEAN-UP OBJECTIVES

Prepared By: RH
Checked By: KC

Fresh Meadows, Queens, New York
Fluor Daniel GTI – Volatile Organic Compounds
Soil Data Summary (Subsurface Investigation)

TABLE 3C (CONTINUED)
BASE NEUTRALS (ug/kg)
SOIL SAMPLES
NEW YORK DRY CLEANING EXPRESS

	B-5 25'-27' ug/kg	B-6 20'-22' ug/kg	B-7 19'-21' ug/kg	B-9 21'-23' ug/kg	B-10 20'-24' ug/kg
PARAMETER					
Naphthalene	<360	<360	<370	<360	<340
Acenaphthene	<360	<360	<370	<360	<340
Fluorene	<360	<360	<370	<360	<340
Phenanthene	<360	<360	<370	<360	<340
Anthracene	<360	<360	<370	<360	<340
Fluoranthene	<360	<360	80J	50J	<340
Pyrene	<360	<360	70J	40J	<340
Chrysene	<360	<360	50J	<360	<340
Benzo (a) Anthracene	<360	<360	40J	<360	<340
Benzo (b) Fluoranthene	<360	<360	<370	<360	<340
Benzo (k) Fluoranthene	<360	<360	50J	<360	<340
Benzo (A) Pyrene	<360	<360	40J	<360	<340
Indeno (1,2,3-C,D) Pyrene	<360	<360	<370	<360	<340
Dibenzo (A,H) Anthracene	<360	<360	<370	<360	<340
Benzo (G,H,I) Perylene	<360	<360	40J	<360	<340

Source: FLUOR DANIEL GTI – UST REMOVAL AND SUBSURFACE INVESTIGATION REPORT, DATED DECEMBER 9, 1997

NA = not applicable
J = Estimated Value
D = Diluted

Prepared By: RH
Checked By: KC

Table 3 - VOLATILE ORGANIC COMPOUNDS - GROUNDWATER DATA SUMMARY

FEDERAL REALTY
NEW YORK DRY CLEANING EXPRESS -SUBSURFACE INVESTIGATION

PARAMETER	NYSDEC TOGS Class GA Ambient Water Quality Standards and Guidance Values*	SAMPLE LOCATION (all results in ug/L)					
		W-1-43'-48'	W-2-43'-48'	W-3-43'-48'	W-4-43'-48'	W-5-43'-48'	W-6-45'-50'
Vinyl Chloride	2	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	5	<1	<1	<1	<1	<1	<1
Trans-1,2-Dichloroethene	5	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	5	<1	<1	<1	<1	<1	<1
Cis-1,2-Dichloroethene	5	4	2	8	5	<1	<1
1,1,1-Trichloroethane	5	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	5	<1	<1	<1	<1	<1	<1
Trichloroethene	5	1	1	1	1	<1	<1
1,1,2-Trichloroethane	5	<1	<1	<1	<1	<1	<1
Tetrachloroethene	5	30	29	120	19	8	65
Benzene	0.7	<1	<1	<1	<1	<1	<1
Toluene	5	<1	<1	<1	<1	<1	<1
Ethylbenzene	5	<1	<1	<1	<1	<1	<1
1,3-Xylene	5	<1	<1	<1	<1	<1	<1
1,4-Xylene	5	<1	<1	<1	<1	<1	<1
1,2-Xylene	5	<1	<1	<1	<1	<1	<1
Isopropylbenzene	5	<1	<1	<1	<1	<1	<1
N-Propylbenzene	5	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene	5	<1	<1	<1	<1	<1	<1
Tert-Butylbenzene	5	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene	5	<1	<1	<1	<1	<1	2
Sec-Butylbenzene	5	<1	<1	<1	<1	<1	<1
P-Isopropyltoluene	5	<1	<1	<1	<1	<1	<1
N-Butylbenzene	5	<1	<1	<1	<1	<1	<1
Naphthalene	10	21	<1	10	8	<1	<1
Total Xylenes	5	<2	<2	<2	<2	<1	<2
Methyl Tert Butyl Ether	50	<1	<1	<1	<1	<1	<1

* - New York State Department of Environmental Conservation Division of Water Technical and Operational Guidance Series (1.1.1), October 1993.
J - Estimated Value
D - Diluted
NA - Not Applicable

FLUOR DANIEL

Source: Fluor Daniel GTI – Underground Storage Tank Removal and Subsurface Investigation Report, dated December 9, 1997		Volatile Organic Compounds Ground Water Summary
New York Dry Cleaning Express 69-60 188th Street Fresh Meadows Queens, NY	**LAW** Environmental Consultants, Inc.	Prepared Date: KC 8/21/98 Checked Date: KWJ Project 20700-8-8051 Table 3D

Table 3 Continued - BASE NEUTRALS - GROUNDWATER DATA SUMMARY

FEDERAL REALTY

NEW YORK DRY CLEANING EXPRESS -SUBSURFACE INVESTIGATION

PARAMETER	NYSDEC TOGS Class GA Ambient Water Quality Standards and Guidance Values	SAMPLE LOCATION (all results in ug/kg) W-1-43'-48'	W-2-43'-48'	W-3-43'-48'	W-4-43'-48'	W-5-43'-48'	W-6-45'-50'
Naphthalene	10	<10	<10	<10	<10	<10	<10
Acenaphthene	50	<10	<10	<10	<10	<10	<10
Fluorene	50	<10	<10	<10	<10	<10	<10
Phenanthrene	50	<10	<10	<10	<10	<10	<10
Anthracene	50	<10	<10	<10	<10	<10	<10
Fluoranthene	50	<10	<10	<10	<10	<10	<10
Pyrene	50	<10	<10	<10	<10	<10	<10
Chrysene	0.002	<10	<10	<10	<10	<10	<10
Benzo (a) Anthracene	0.002	<10	<10	<10	<10	<10	<10
Benzo (b) Fluoranthene	0.002	<10	<10	<10	<10	<10	<10
Benzo (k) Fluoranthene	0.002	<10	<10	<10	<10	<10	<10
Benzo (A) Pyrene	ND	<10	<10	<10	<10	<10	<10
Indeno (1,2,3-C,D) Pyrene	0.002	<10	<10	<10	<10	<10	<10
Dibenzo (A,H) Anthracene	50	<10	<10	<10	<10	<10	<10
Benzo (G,H,I) Perylene	50	<10	<10	<10	<10	<10	<10

* - New York State Department of Environmental Conservation Division of Water Technical and Operational Guidance Series (1.1.1), October 1993.

J - Estimated Value

D - Diluted

NA - Not Applicable

New York Dry Cleaning Express
69-60 188th Street
Fresh Meadows
Queens, NY

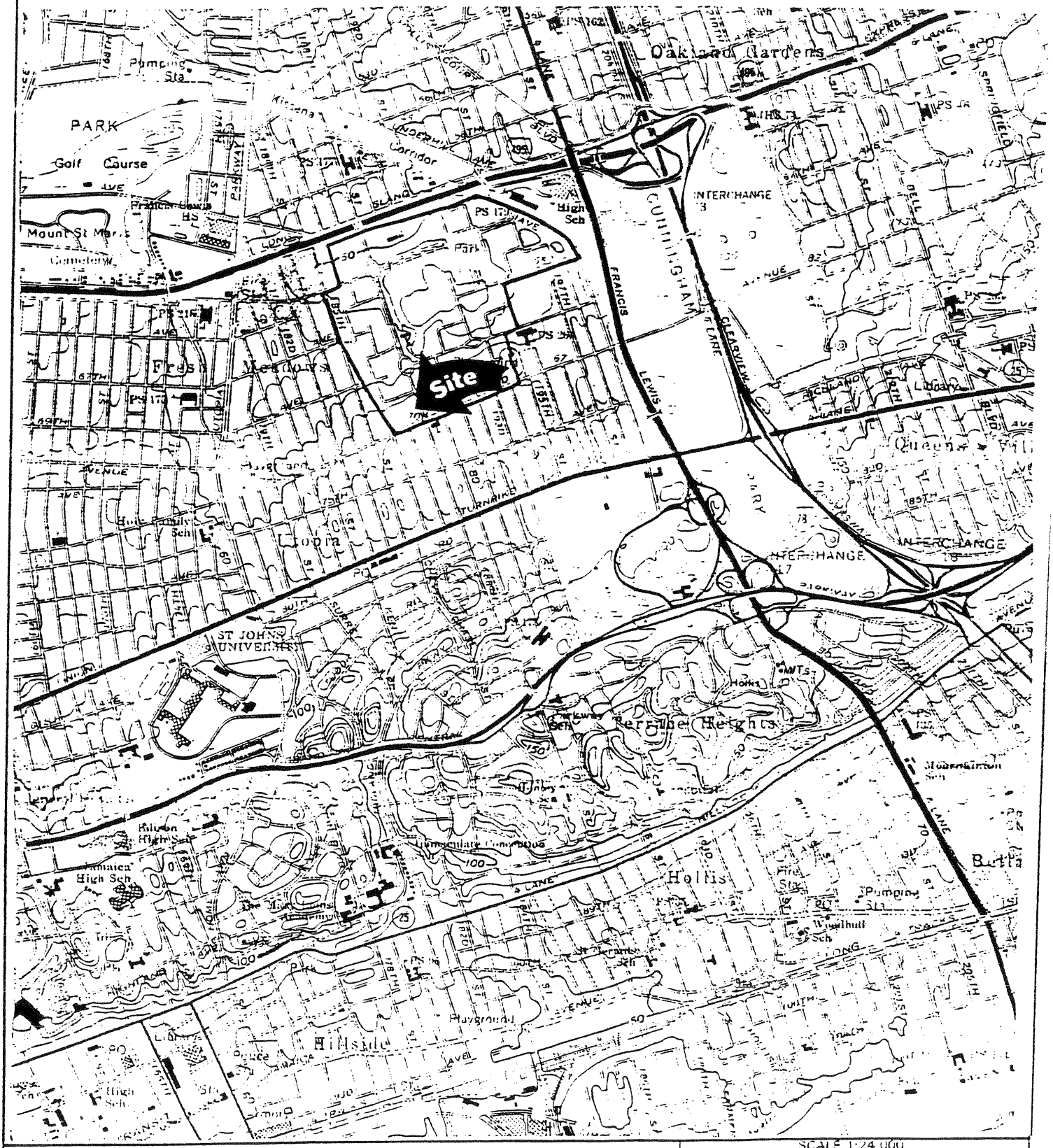
Source: Fluor Daniel GTI – Underground Storage Tank Removal and Subsurface Investigation Report, dated December 9, 1997

LAW
Environmental Consultants, Inc.

Base Neutrals
Ground Water Data Summary

Prepared Date: 8/21/98
Checked Date: [signature]
Project 20700-8-8051
Table 3E

FIGURES



SOURCES: U.S.G.S. 7.5' QUADRANGLE, JAMAICA, NY 1966
PHOTOREVISED 1979

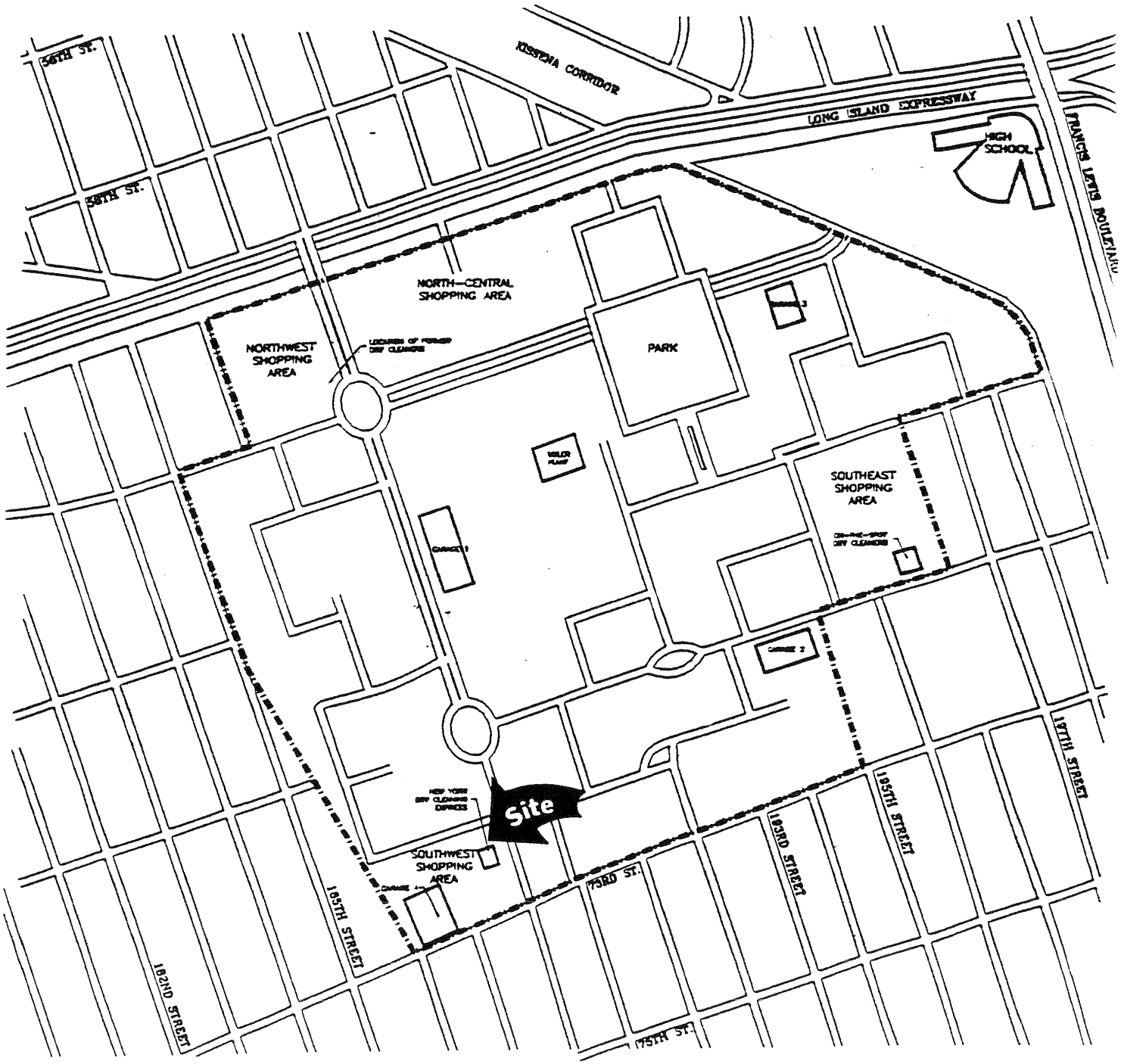
SCALE 1:24 000

TOPOGRAPHIC/SITE LOCATION MAP

FRESH MEADOWS
FLUSHING, NY

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES

PREPARED/DATE RES 02/26/97
CHECKED/DATE
PROJECT 20770-7-7015 FIGURE 1



REFERENCE: U.S. GEOLOGICAL SURVEY MAP, FIELD NOTES

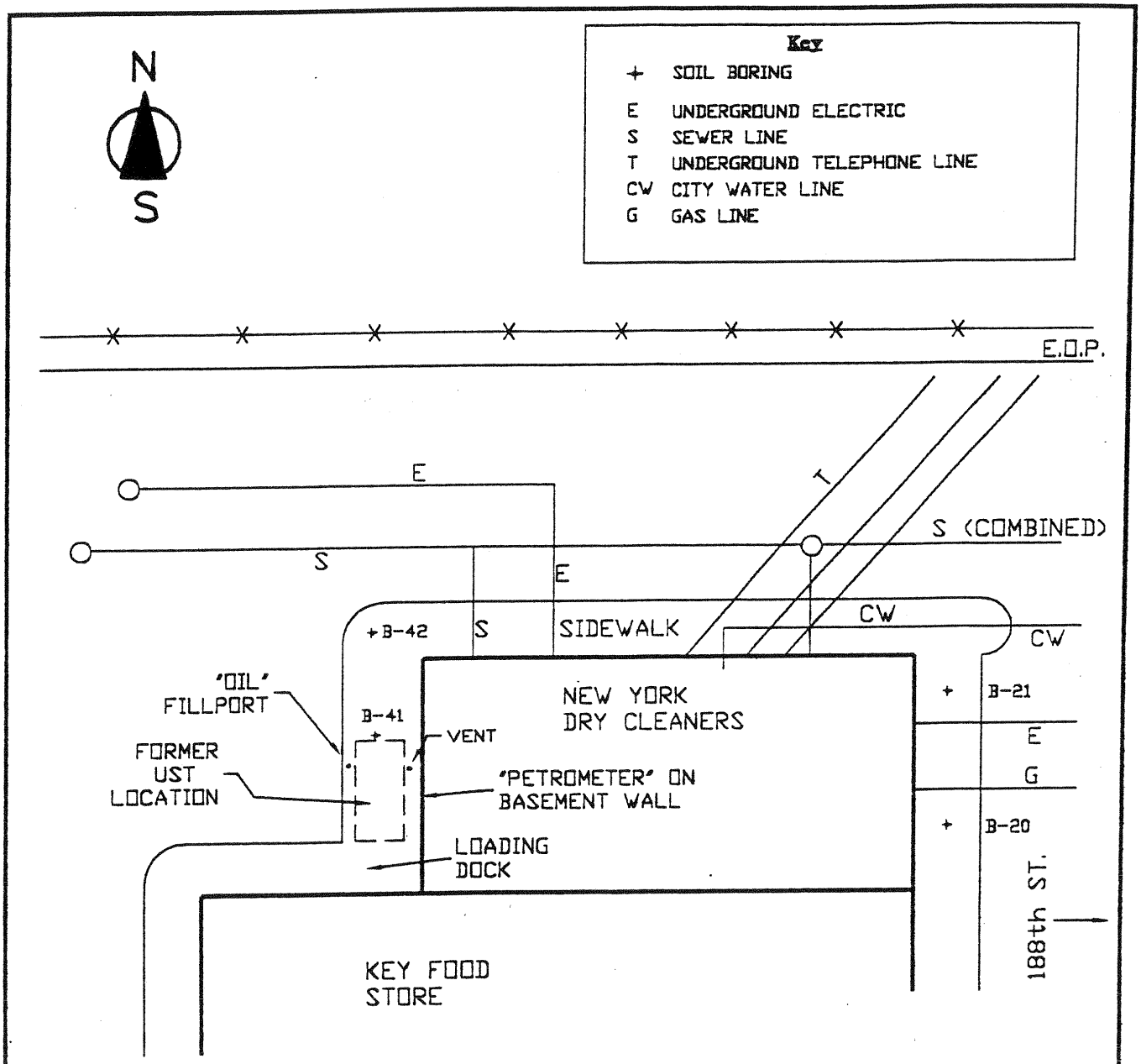
NOT TO SCALE

Figure 2: Site Plan

FRESH MEADOWS
QUEENS, NEW YORK

LAW
ENVIRONMENTAL CONSULTANTS, INC.
666 FIFTH AVENUE, 24TH FLOOR
NEW YORK, NEW YORK 10103

PROJECT:	20770-7-7015		
PHASE:	001	TASK:	9G8
PREPARED:	T.A.		04/03/97
CHECKED:	R.S.		04/03/97



REFERENCE: FIELD NOTES

FIGURE 3

Not to Scale

NEW YORK EXPRESS
DRY CLEANERS
FRESH MEADOWS
Queens, New York

LAW
ENVIRONMENTAL CONSULTANTS, INC.

PROJECT: 20700-8-8051
PREPARED: RH
CHECKED: KC

SAMPLE LOCATION MAP

LAW
ENVIRONMENTAL CONSULTANTS, INC.
666 FIFTH AVENUE, 24TH FLOOR
NEW YORK, NY 10103

JOB NO. 20700-7-9090 ph 02 SHEET ____ OF ____
JOB NAME FRESH MEADOWS, QUEENS, I
BY K. CONVERSE DATE 11/20/97
CHECKED BY KWS 1/12/98 DATE ____

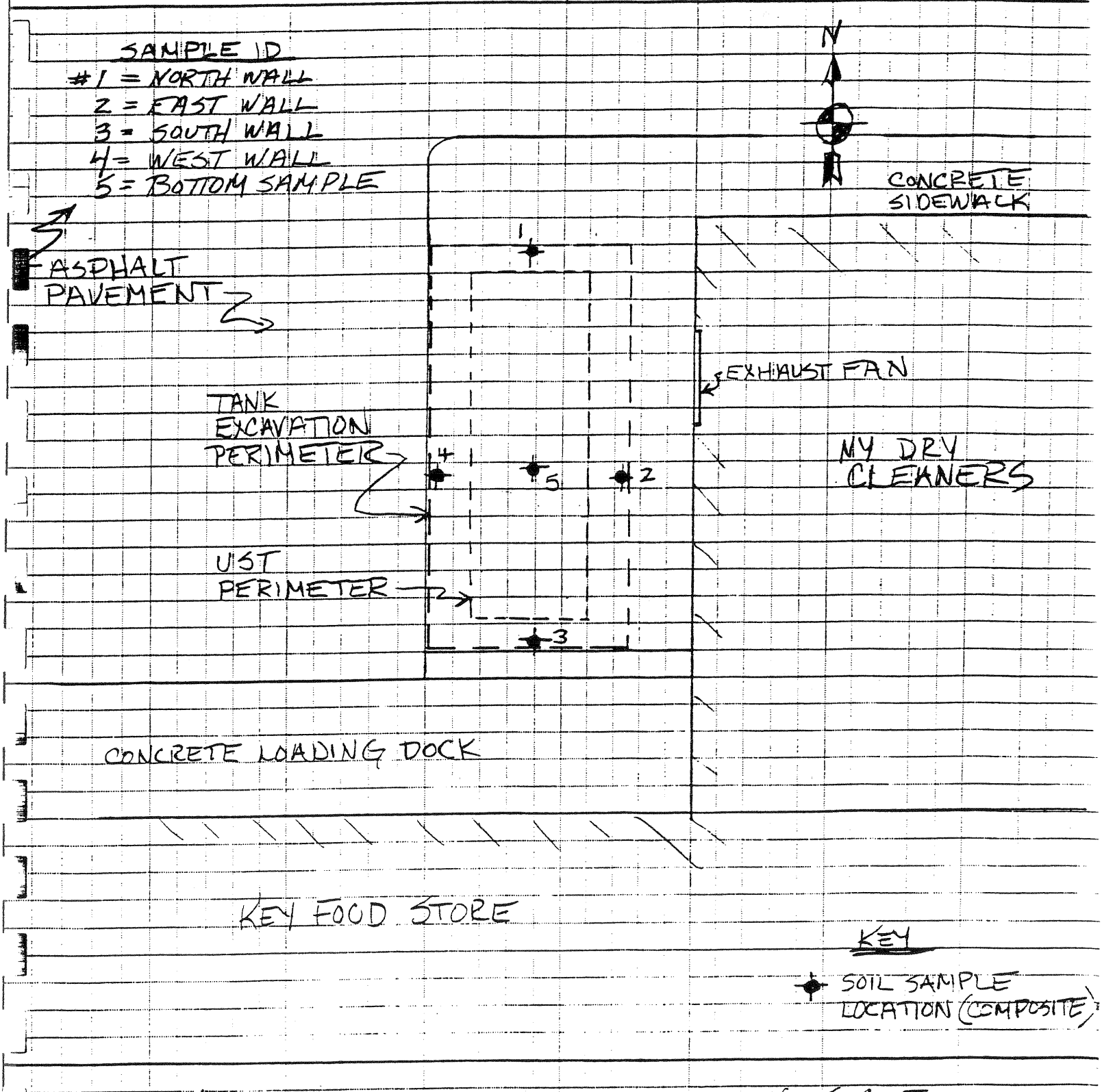
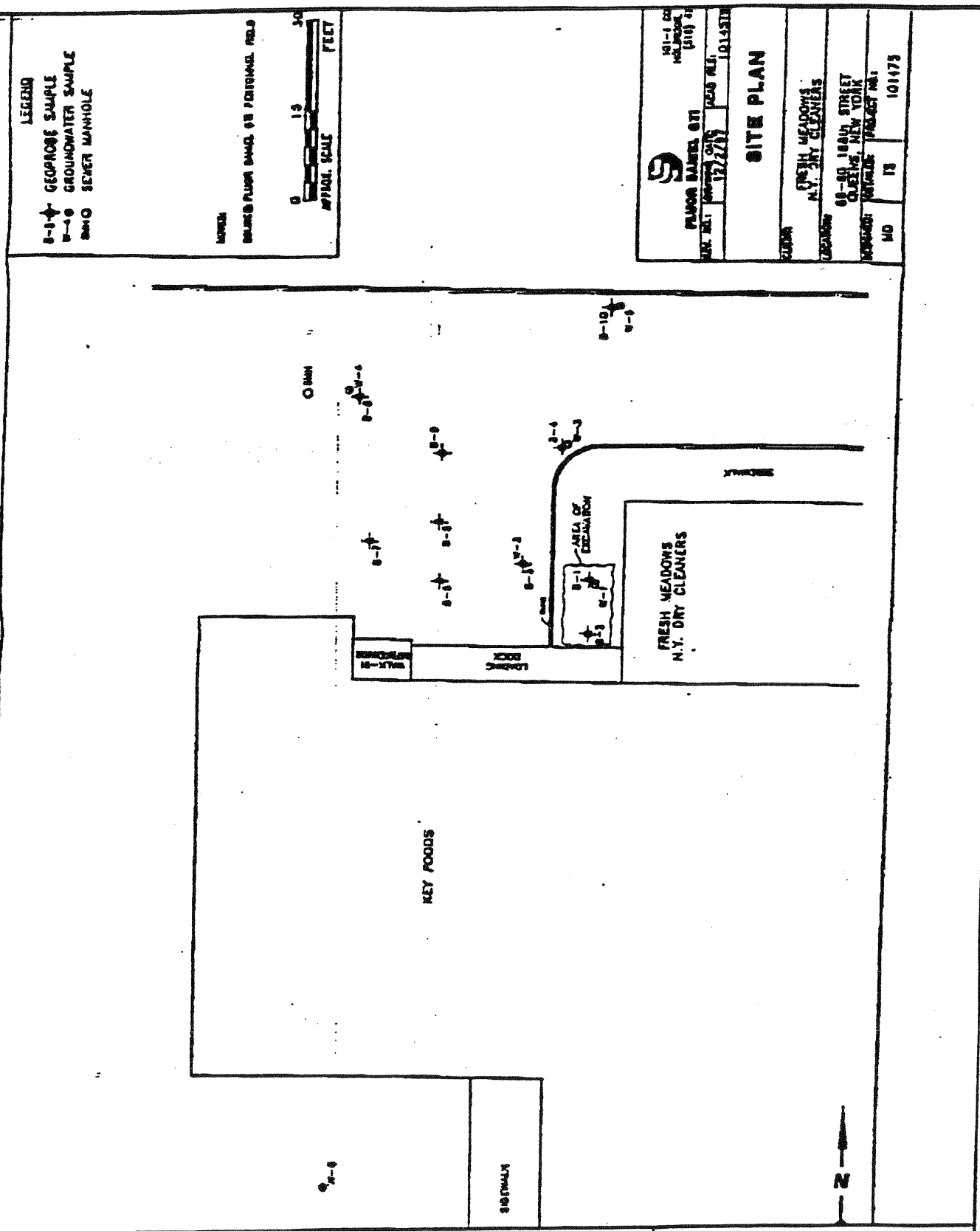


FIGURE 4
SOIL SAMPLING LOCATIONS
UST SYSTEM CLOSURE
NY DRY CLEHNERS, 69-60 188th St. QUEENS, NY

No SCALE



SOURCE: Fluor Daniel GTI - Underground Storage Tank Removal and Subsurface Investigation Report, Dated December 9, 1997

Scale As Shown

Fluor Daniel GTI Site Plan

NEW YORK EXPRESS
DRY CLEANERS
FRESH MEADOWS
Queens, New York

LAW
ENVIRONMENTAL CONSULTANTS, INC.

PROJECT: 20700-8-8051
PREPARED: KC 8/21/98
CHECKED: KWS

Figure 5

LAW
ENVIRONMENTAL CONSULTANTS, INC.

666 FIFTH AVENUE, 24TH FLOOR
NEW YORK, NY 10103

JOB NO. 20700-7-9090 ph 02 SHEET ____ OF ____

JOB NAME FRESH MEADOWS, QUEENS

BY K. CONVERSE DATE 11/20/97

CHECKED BY KWS 1/12/98 DATE ____

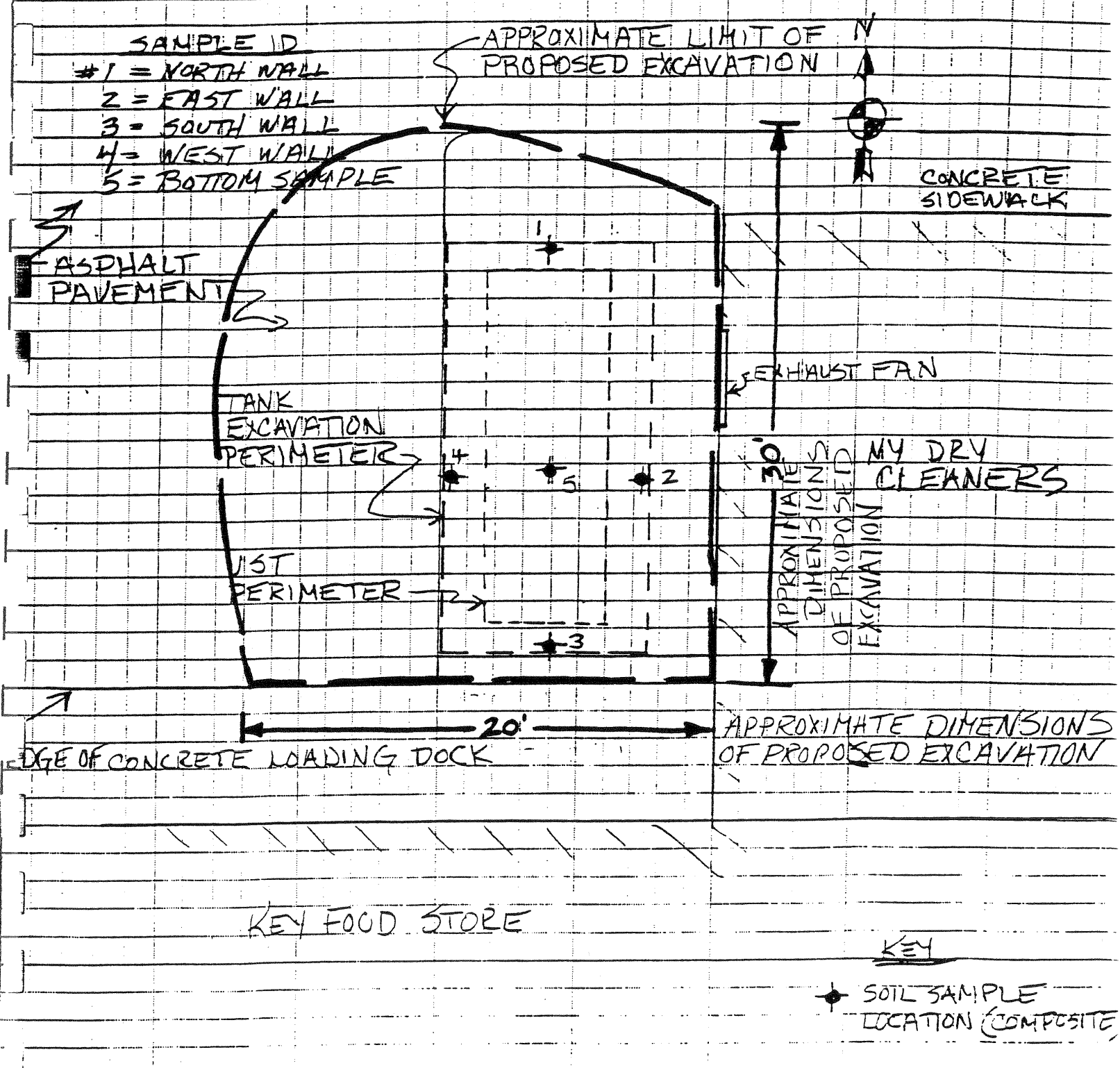
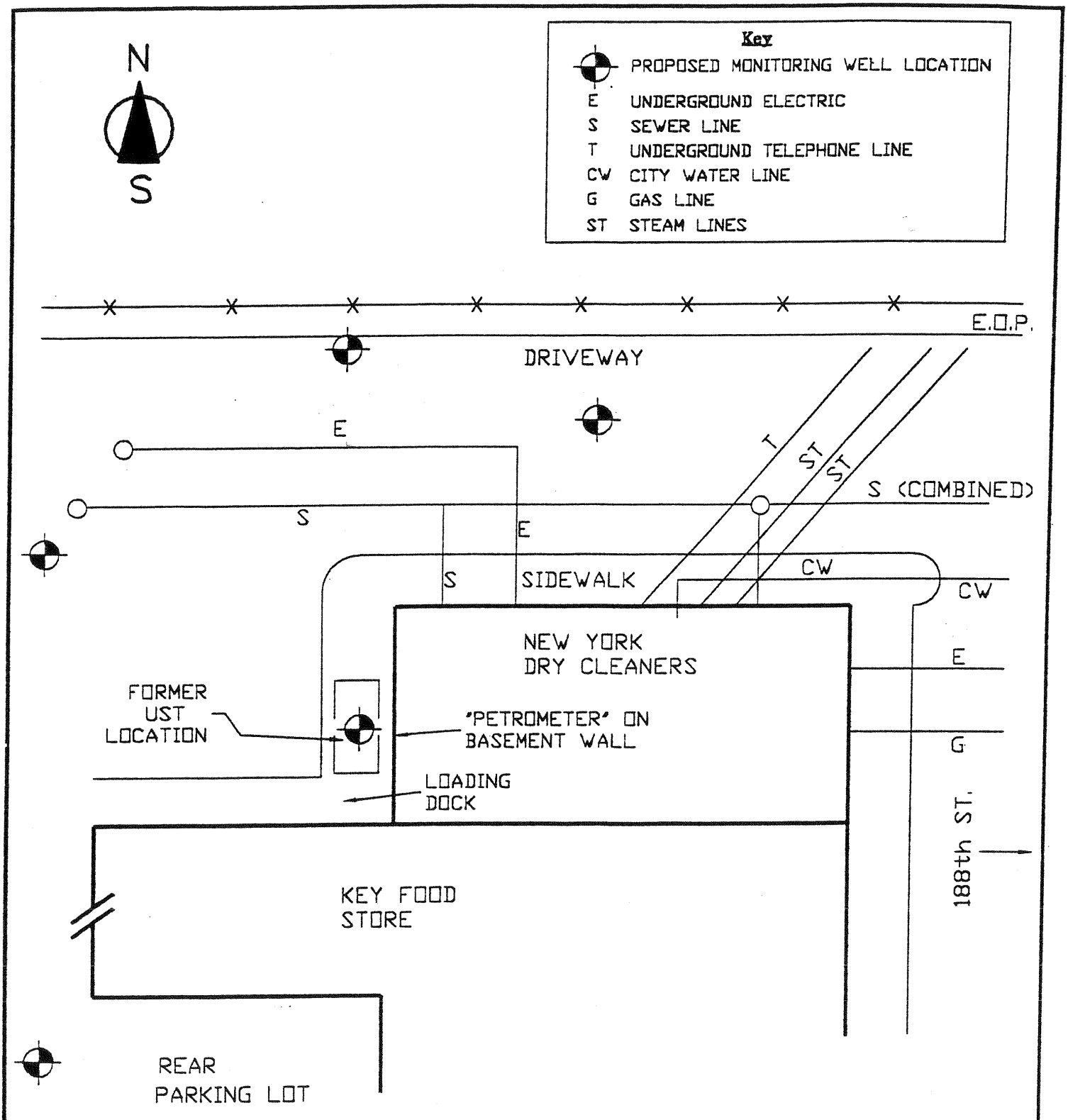


FIGURE 6 NO SCALE

PROPOSED SOIL EXCAVATION PLAN

NY DRY CLEANERS, 69-60 188th St, QUEENS NY



REFERENCE: FIELD NOTES

FIGURE 7

Not to Scale

NEW YORK EXPRESS
DRY CLEANERS
FRESH MEADOWS
Queens, New York

LAW
ENVIRONMENTAL CONSULTANTS, INC.

PROJECT: 20700-8-8051
PREPARED: RH
CHECKED: KC

PROPOSED MONITORING WELL LOCATION MAP

APPENDIX C

Site Specific Health and Safety Plan
and
Community Air Monitoring Plan

MACTEC Engineering & Consulting, Inc.
5205 Militia Hill Road
Plymouth Meeting, PA 19462

HEALTH AND SAFETY PLAN

New York Express Dry Cleaners
69-60 188th Street, Flushing, Queens, NY
Site No. V-00199-2
Project No. 20800-2-0034

1) Names of Key Personnel

Project Principal	Doug Newton
Field Safety Coordinator	Jim Ryan
Project Manager	Mitchell Moss
Date of Plan Preparation:	May 6, 2004
Date of Planned Field Activities:	Starting June 2004

2) Description of Work

Installation of monitoring wells, Soil Vapor Extraction (SVE) system test, groundwater and soil vapor monitoring.

3) Health and Safety Risks

The primary health and safety risks potentially present at the subject site include exposure to hazardous/toxic substances and vehicular traffic. Each are detailed below in addition to other typical hazards associated with the project work:

Hazardous/Toxic Substances

Hazardous/toxic substances may exist in on-site soils. Chemical characteristics and OSHA Permissible Exposure Limits (PEL) are discussed under the following subheading.

Chemical Hazard Characterization - Soil

Chemical data from prior investigations at the site indicates that tetrachloroethylene is of greatest concern at the subject site. The primary routes of exposure to this compound are dermal contact and inhalation.

Refer to Items 5) and 7), page 3 for monitoring guidance and personal protection requirements.

Heat and Cold Stress Hazards

	Degree	Result
Heat Stress	Extreme	Heat Stroke
	Moderate	Dizziness or Fatigue
Cold Stress	Extreme	Frost Bite
	Moderate	Hypothermia

Should heat stress be a factor in working conditions, workers should take rest breaks, and drink cool water. Exposure to hot environments can cause physiological and psychological adjustments during the first week of exposure.

Cold stress symptoms - lower body temperature will result in reduced mental alertness, impaired judgement, or loss of consciousness. Workers should take frequent rest breaks in a warm area and drink warm liquids.

Physical Hazards

Heavy equipment (i.e., drill rig) will be on-site during well installation activities. Caution must be exercised when working near or on the equipment. Wear hard hats, steel-toed shoes or boots, and safety glasses when heavy equipment is present. Verify that back-up alarms and safety shut-off switches are operating each day.

SVE test equipment involves rotating equipment, pressurized lines and electricity. Personnel shall ensure that all guards are in place on rotating equipment prior to use and that electrical cords and switchgear are in good working order. Proper Lock Out / Tag Out procedures are to be followed for system maintenance, line work (such as sampling), and system operation.

A clean work area shall be kept to prevent any slips, trips, or falls.

Traffic at the site may present a physical hazard when performing work activities in driveway and parking areas. Traffic cones and high visibility vests will be used to increase worker's visibility and protection from traffic. A flag person shall be assigned if local traffic in the driveway or view obstructions warrant.

4) Employee Training

MACTEC Engineering & Consulting, Inc. (MACTEC E&C) field personnel have completed the 40 hour course entitled "Health and Safety Training for Hazardous Waste Operations", with yearly 8 hour course updates. Field personnel will also receive site-specific training that will address activities, hazards, monitoring, and personal protective equipment for the site, as

appropriate. Employee training records, for the personnel assigned to this project, are maintained in MACTEC Engineering & Consulting, Inc.'s Plymouth Meeting, Pennsylvania office.

5) Personal Protective Equipment (PPE)

The following PPE must be available for use while at the work site: steel-toed boots, hard hat, protective eyewear, nitrile gloves, cloth or leather work gloves. Tyvek personal protection suits must be available for use on-site when soil or ground water is likely to contact workers skin

6) Medical Surveillance

All MACTEC E&C field personnel participate in the MACTEC Engineering & Consuling, Inc. medical monitoring program.

7) Monitoring

Monitoring for the site will be conducted on a real time basis using either a photoionization or flame ionization detector (PID or FID). Tetrachloroethylene (aka Perk or perchloroethylene) is a non combustable, colorless liquid with an odor like ether or chloroform. The compound has an ionization potential of 9.32 eV. NIOSH lists this compound as an occupational carcinogen. Exposure limits are listed in the NIOSH pocket guide as follows:

100 ppm 8 hr TWA
200 ppm ceiling
300 ppm / 5 minute / 3 hour peak

More detailed information for tetrachloroethylene is provided in the attached from *Dangerous Properties of Industrial Materials* by Sax and Lewis, Seventh Edition, Van Nostrand Reinhold.

8) Location of Work Site

The "work site" will be considered to be the area within an approximate 60-foot radius of the former UST location.

9) Decontamination

Decontamination Procedures - Wash hands with potable water and soap prior to leaving the site, change gloves following each procedure. Gloves and other disposable personal protective equipment will be disposed of at a location designated by the site owner or bagged and taken off site for disposal with other non regulated trash by MACTEC.

10) Emergency Procedures

Medical emergencies may take precedence over decontamination procedures. Know the route to nearest telephone and hospital. Directions and map to the hospital are attached. Contact

Emergency Numbers	**Fire:**	**911**
	Hospital:	**Parkway Hospital** **7035 113th Street # 1** **Flushing, NY** **718-990-4100**
	MACTEC E&C:	**Mitchell Moss 610-941-9700** **Doug Newton 610-941-9700**

Work Precautions

1. Prior to any employee or subcontractor personnel beginning work on the site, the designated Field Safety Coordinator shall brief the employee on the contents of this plan.

2. No eating, drinking, smoking or putting hands in mouth while on the work site. No beards allowed for those who are required to wear respirators.

3. Designated PPE shall be worn at all times while at the work site.

4. Wash all exposed skin areas with soap and water before departing from the work site.

5. Non-impervious clothing that becomes contaminated during site activities should be removed and replaced with clean non-impervious clothing.

6. Enter the site only at the direction of MACTEC E&C's designated Field Safety Coordinator.

PERSONNEL POTENTIALLY EXPOSED TO HAZARDOUS MATERIALS

By initialing and dating this form, the listed individual acknowledges that he has read and understands and will comply with the requirements of this Health and Safety Plan.

Personnel Authorized to Enter Site	Date	Initials of Personnel
1. William Bezts		
2. Jim Ryan		
3. Mike Faith		
4. Steve Cap		
5. Mitch Moss		
6. Doug Newton		
7.		
8.		

MAPQUEST

Send To Printer Back to Map

Parkway Hospital: 718-990-4100
7035 113th St # 1
Flushing NY
11375 US

Notes:

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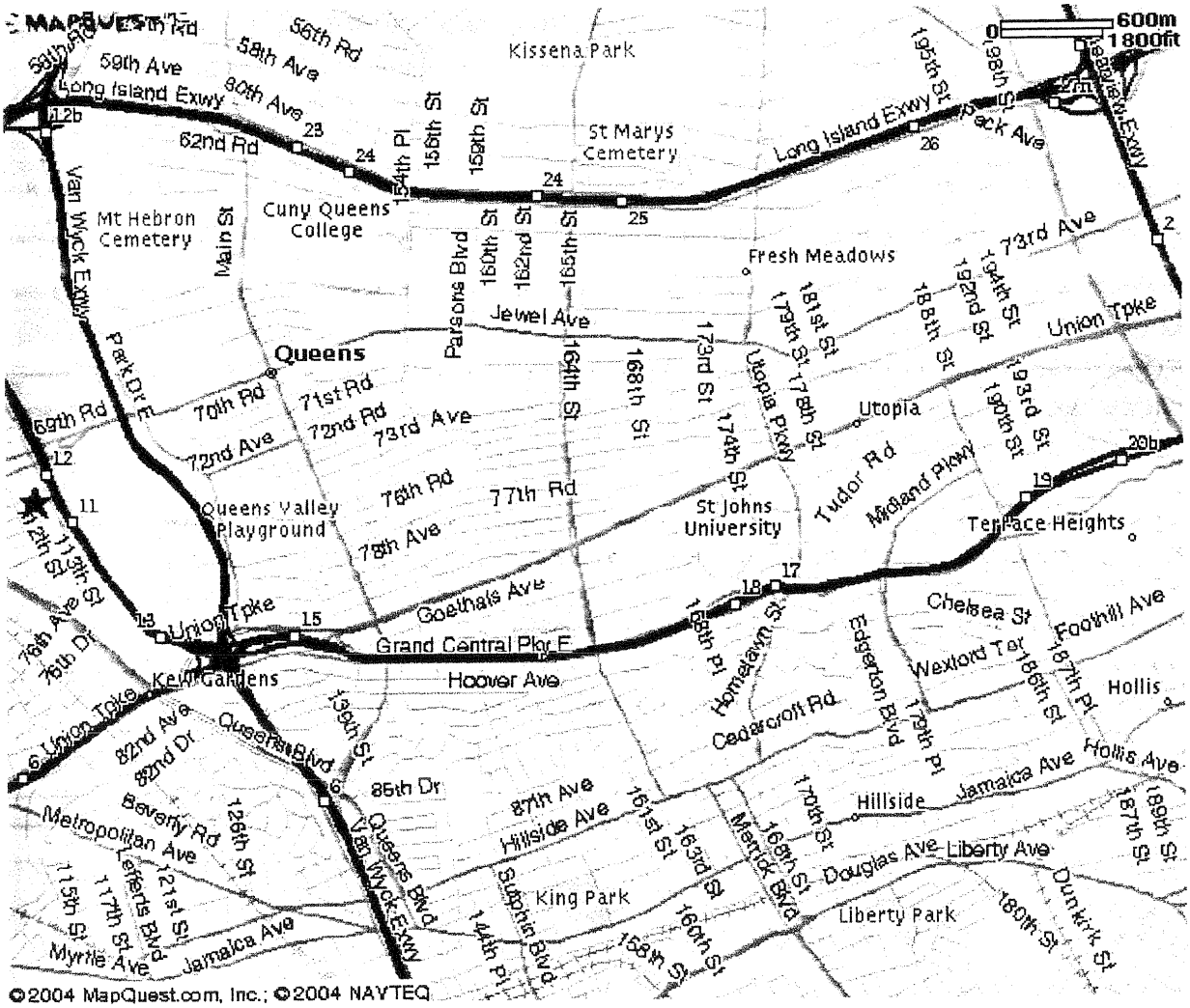

This Health and Safety Plan has been prepared for the exclusive use of MACTEC Engineering & Consulting, Inc.'s personnel involved in the project activities described in this plan. It is provided to others for informational purposes only and should not be used in place of Health and Safety plans developed for other's activities at this site.

FIELD SAFETY COORDINATOR'S SUMMARY

(To be completed by Field Safety Coordinator after completion of project, and returned to Project Principal).

During the work covered by this Safety Plan, there were:

a.☐ No violations of the Safety Plan provisions and no obvious contamination of MACTEC employees or subcontractors.

b.☐ The following incidents, violations of the Safety Plan provisions, or obvious contamination of MACTEC E&C personnel or subcontractors occurred. (Give details of who, when, type of contamination, circumstances, first aid or medical assistance. Use separate sheet, if necessary.)

_____

_____

_____

_____

Signature _____ Date
Field Safety Coordinator

RETURN TO PROJECT PRINCIPAL

ALL ACCIDENTS AND INCIDENTS CAUSING POTENTIAL EXPOSURE TO HAZARDOUS MATERIALS MUST BE REPORTED AS SOON AS POSSIBLE TO:

1) PROJECT PRINCIPAL, or
2) CHIEF ENGINEER, or
3) BRANCH MANAGER

JOB NAME

JOB NUMBER

DATES IN FIELD

PPG INDUSTRIES -- PERCHLOROETHYLENE

==========

MSDS Safety Information

==========

FSC: 6810
NIIN: 00-270-9982
MSDS Date: 04/17/1995
MSDS Num: BXWCF
Product ID: PERCHLOROETHYLENE
MFN: 01
Responsible Party
Cage: 88944
Name: PPG INDUSTRIES
Address: ONE GATEWAY CENTER
City: PITTSBURGH PA 15222-1416
Info Phone Number: 304-843-1300
Emergency Phone Number: 304-843-1300
Preparer's Name: R. KENNETH LEE
Review Ind: Y
Published: Y

==========

Preparer Co. when other than Responsible Party Co.

==========

Cage: 88944
Name: PPG INDUSTRIES
Address: ONE GATEWAY CENTER
City: PITTSBURGH PA 15222-1416

==========

Contractor Summary

==========

Cage: 88944
Name: PPG INDUSTRIES
Address: ONE GATEWAY CENTER
City: PITTSBURGH PA 15222-1416
Phone: UNKNOWN

==========

Item Description Information

==========

Item Manager: GSA
Item Name: TETRACHLOROETHYLENE,TECHNICAL
Specification Number: ASTM D 4081
Type/Grade/Class: GRADE A
Unit of Issue: DR
Quantitative Expression: 00000000055GL
UI Container Qty: 1
Type of Container: DRUM

==========

Ingredients

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Cas: 127-18-4
RTECS #: KX3850000
Name: PERCHLOROETHYLENE (TETRACHLOROETHYLENE) (SARA 313) (CERCLA) (STABILIZED)
% Wt: >99
Other REC Limits: NONE RECOMMENDED
OSHA PEL: 100 PPM, Z-2
ACGIH TLV: 25PPM/100STEL,A3; 95
EPA Rpt Qty: 100 LBS
DOT Rpt Qty: 100 LBS

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Health Hazards Data

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==========
Handling and Disposal
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Fire and Explosion Hazard Information
==========
Flash Point Text: NONE
Lower Limits: NONE
Upper Limits: NONE
Extinguishing Media: WATER, DRY CHEMICALS, CARBON DIOXIDE.
Fire Fighting Procedures: FIREFIGHTERS SHOULD WEAR NIOSH/MSHA APPROVED PRESS DEMAND SELF-CONTAINED BREATH APPARATUS FOR POSSIBLE EXPO TO HYDROGEN CHLORIDE & POSSIBLE TRACES OF PHOSGENE.
Unusual Fire/Explosion Hazard: PERCHLOR INVOLVED IN FIRES CAN DECOMPOSE TO HYDROGEN CHLORIDE AND POSSIBLE TRACES OF PHOSGENE.
==========
Control Measures
==========
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Physical/Chemical Properties
==========
HCC: T4
B.P. Text: 250F,121C
M.P/F.P Text: -8F,-22C
Vapor Pres: 14.2 @20C
Vapor Density: 5.83
Spec Gravity: 1.6
PH: SUPPLE
Evaporation Rate & Reference: 0.09. ETHYL ETHER=1
Solubility in Water: 0.015% @25C
Appearance and Odor: CLEAR, COLORLESS LIQUID WITH ETHER-LIKE ODOR.
Percent Volatiles by Volume: 100
==========
Reactivity Data
==========
Stability Indicator: YES
Stability Condition To Avoid: OPEN FLAMES, HOT GLOWING SURFACES OR ELECTRIC ARCS.
Materials To Avoid: NONE.
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Toxicological Information
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Ecological Information
==========
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MSDS Transport Information
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==========
Regulatory Information
==========
==========
Other Information
==========
==========
Transportation Information
==========
Responsible Party Cage: 88944
Trans ID NO: 64595

Product ID: PERCHLOROETHYLENE
MSDS Prepared Date: 04/17/1995
Review Date: 03/18/1998
MFN: 1
Tech Entry NOS Shipping Nm: TETRACHLOROETHYLENE
Net Unit Weight: 732.8 LBS
Multiple KIT Number: 0
Review IND: Y
Unit Of Issue: DR
Container QTY: 1
Type Of Container: DRUM
Additional Data: PER MSDS:SHIPPING NAME:TETRACHLOROETHYLENE,6.1,UN1897,PGK III,RQ:100LBS/45.4KG.

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Detail DOT Information

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DOT PSN Code: NYB
DOT Proper Shipping Name: TETRACHLOROETHYLENE
Hazard Class: 6.1
UN ID Num: UN1897
DOT Packaging Group: III
Label: KEEP AWAY FROM FOOD
Special Provision: N36,T1
Packaging Exception: 153
Non Bulk Pack: 203
Bulk Pack: 241
Max Qty Pass: 60 L
Max Qty Cargo: 220 L
Vessel Stow Req: A
Water/Ship/Other Req: 40

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Detail IMO Information

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IMO PSN Code: OJV
IMO Proper Shipping Name: TETRACHLOROETHYLENE
IMO PSN Modifier: P
IMDG Page Number: 6264
UN Number: 1897
UN Hazard Class: 6.1
IMO Packaging Group: III
Subsidiary Risk Label: -
EMS Number: 6.1-02
MED First Aid Guide NUM: 340

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Detail IATA Information

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IATA PSN Code: XOW
IATA UN ID Num: 1897
IATA Proper Shipping Name: TETRACHLOROETHYLENE
IATA UN Class: 6.1
IATA Label: TOXIC
UN Packing Group: III
Packing Note Passenger: 605
Max Quant Pass: 60L
Max Quant Cargo: 220L
Packaging Note Cargo: 612

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Detail AFI Information

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AFI PSN Code: XOW

AFI Proper Shipping Name: TETRACHLOROETHYLENE
AFI Hazard Class: 6.1
AFI UN ID NUM: UN1897
AFI Packing Group: III
Special Provisions: P5, N36
Back Pack Reference: A10.5
==========
HAZCOM Label
==========
Product ID: PERCHLOROETHYLENE
Cage: 88944
Company Name: PPG INDUSTRIES
Street: ONE GATEWAY CENTER
City: PITTSBURGH PA
Zipcode: 15222-1416
Health Emergency Phone: 304-843-1300
Label Required IND: Y
Date Of Label Review: 10/23/1995
Status Code: C
Label Date: 10/23/1995
Origination Code: F
Eye Protection IND: YES
Skin Protection IND: YES
Signal Word: DANGER
Respiratory Protection IND: YES
Health Hazard: Severe
Contact Hazard: Moderate
Fire Hazard: None
Reactivity Hazard: None
Hazard And Precautions: INHAL:CNS DEPRESS,CNS DMG W/OVEREXPO.RESP TRACT IRRIT,DEATH IN CONFINED/POORLY VENTI AREA.DEATHS FRM VENFIB.EYE/SKIN:DISCMFT,PAIN,IRRIT.PROL/REP LIQ CONTACT ON SKIN IRRIT/DERM.INGEST:MOUTH/GI IRRIT,VO MIT,ASPIRATION,CHEM PNEU/PULM EDEMA,DEATH.TARGET ORGANS:CNS/LIVER/KIDNEY/EYE/SKIN/RESP TRACT.1STAID:INHAL:MOVE TO FRESH AIR.NOT BREATH GIVE ART RESP(MOUTH-TO-MOUTH).BREATH DIFFI GIVE OXY.CALL DR.EYE/S KIN:FLUSH W/LOTS OF WATER(SOAP/WATER FOR SKIN)@LEAST 15MINS.REMOVE CONTAMIN CLOTH/SHOES.IRRIT OCCURS SEE DR.INGEST:CONSC DRINK LG AMTS OF WATER.DO NOT INDUCE VOMIT.TAKE IMMED TO HOSP/DR.UNCONSC/CONVUL TAKE IMMED TO HOSP.
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Community Protection Plan

Real-time air monitoring for nuisance dust and VOCs at the perimeter of the work area is necessary to determine that the health and safety of onsite workers and the community is protected. Tetrachloroethylene has been identified as the primary contaminant of concern through soil and groundwater sampling; therefore, monitoring for its presence will be required. The following monitoring activities will be conducted at the site for worker and community protection.

Frequency of Monitoring

Monitoring will be conducted at the downwind perimeter of the work area at the start of any intrusive subsurface activities (ie. installation of groundwater well, temporary soil vapor point, SVE well, etc). After baseline readings are established for each intrusive activity, monitoring will be adjusted accordingly but to a frequency no less than once per day. Monitoring will only be conducted on days with activities that could cause or allow emissions. All readings will be available for NYSDEC and New York State Department of Health (NYSDOH) personnel to review.

Emission Response Plan

If the total particulate levels exceed 5 mg/m3 above background or if VOC readings exceed 50 % of the PEL for tetrachlotoethylene (50 ppmv), corrective measures will be implemented. Measures such as dust control watering or modifying the responsible work activity will be taken. Monitoring frequency will be increased to hourly if appropriate to verify that the workers and community are protected.

If the organic vapor level is above 50 ppm at the perimeter of the work area, work activities must be modified or shut down. Downwind air monitoring, as directed by the HSC, will be implemented to check that vapor emission does not impact the nearest residential or commercial structure at levels exceeding the previously established background.

Major Emission

If VOC levels at the perimeter of the work zone reach 100 ppm, work activities will be shut down and immediate corrective actions will be implemented.

If total particulate levels sustain 5 mg/m3 above background for 15 minutes, work activities will be shut down and immediate corrective actions will be implemented.

Corrective actions could include covering the exposed soils or the work area with plastic or containerizing all drill cuttings. Work activities will suspended until the responsible work activity has been appropriately modified to prevent a recurrence of the emissions and the project manager has approved the activity changes.

Major Emission Response Plan

Upon activation, the following activities will also be undertaken:

- The Project Manager, NYSDOH, and NYSDEC will immediately be contacted by the HSC and advised of the situation.
- Frequent air monitoring will be conducted at 30 minute intervals within the work zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the HSC.
- Emergency contacts will go into effect as appropriate.

APPENDIX D

Quality Control/Quality Assurance Plan

QUALITY ASSURANCE PROJECT PLAN

New York Express Drycleaners
Implementation of Remedial Investigation and Remedial Action Activities

Site No. V-00199-2
69-60 188th Street, Fresh Meadows
Queens County, New York

May 2004

TABLE OF CONTENTS

1.0 PURPOSE

This quality assurance project plan (QAPP) establishes the guidelines for generating reliable data (i.e. scientifically valid, defensible, comparable and of known precision and accuracy).

This QAPP is an extension of the Sampling and Analysis Plan (SAP) and contains a detailed discussion of the quality assurance protocols to be used by laboratory personnel, as well as a project description, and project organization and responsibilities.

1.1 SCOPE OF WORK

Sampling and analysis of environmental samples will be performed as part of the Scope of Work during the pilot testing of a soil vapor extraction (SVE) system and implementation of a groundwater monitoring plan.

1.2 DEFINITIONS

The following definitions are included for terms that are used in the QAPP.

- Accuracy – the degree of agreement of a measurement (or an average of measurements of the same thing), X, with an accepted reference or "true value", T, usually expressed as the difference between the two values, X-T, or the difference as a percentage of the reference or true value, 100 (X-T)/T, and sometimes expressed as a ratio, X/T. Accuracy is an estimate of the bias in a system.

- Analyte – the chemical or property for which a sample is analyzed.

- Comparability – the expression of information in units and terms consistent with reporting conventions; the collection of data by equivalent means; or the generation of data by the same analytical method. Aqueous samples shall be reported as micrograms per liter (µg/L). Solid samples shall be reported in units of milligrams per liter (mg/kg), dry weight.

- Completeness – the percentage of valid data obtained from a measurement system relative to that which would be expected under normal conditions. Data are judged valid if they meet the stated precision and accuracy goals.

- Duplicate – two separate samples taken from the same source by the same person at essentially the same time and under the same conditions that are placed into separate containers for independent analysis. Duplicate samples are intended to assess the effectiveness of equipment decontamination, the precision of sampling efforts, the efforts of ambient environmental conditions on sensitive analyses (e.g., volatile organics analysis [VOA]), and the potential for contaminants attributable to reagents or decontamination fluids. Identifying such potential sources or error is essential to the success of the sampling program and the validity of the environmental data. Each quality control (QC) sample is described below. At a minimum, each set of twenty or fewer field samples should include a trip blank, a duplicate and one sample collected in a sufficient volume to allow the laboratory to perform a matrix spike analysis.

- Episode – a continuous period of time during which sampling activities are undertaken. Cessation of activities for more than 48 hours terminates the episode.

- Field Blanks – field blanks (sometimes referred to as "equipment blanks" or "sampler blanks") are the final analyte-free water rinse from equipment decontamination in the field and are collected at least one during a sampling episode. If analytes pertinent to the project are found in the field blank, the results from the blanks will be used to qualify the levels of analytes in the samples. This qualification is made during data validation. The field blank is analyzed for the same analytes as the sample that has been collected with that equipment.

- Precision – a measure of the agreement among individual measurements of the sample property under prescribed similar conditions. Precision is generally reported as Relative Standard Deviation (RSD) or Relative Percent Difference (RPD). Relative standard deviation is used when three or more measurements are available and is calculated as:

$$RSD = \frac{\text{Standard Deviation}}{\text{Arithmetic Mean}} \times 100$$

Relative percent difference is used for duplicate measurements and is calculated as:

$$RPD = \frac{\text{Value 1 - Value 2}}{\text{Arithmetic mean}} \times 100$$

- Quality Assurance (QA) – actions taken in the field and inside the laboratory to make certain that all procedures and protocols use the same calibration and standardization procedures for reporting results; also, a program which integrates the quality planning, quality assessment, and quality improvements activities within an organization.

- Quality Control (QC) – actions taken by an analyst to ensure that the total measurement system is calibrated correctly. It is achieved by using reference standards, duplicates, replicates, and sample spikes. In addition, the routine application of procedures designed to ensure that the data produced achieve known limits of precision and accuracy.

- Representativeness – expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition.

- Replicate – two aliquots taken from the same sample container and analyzed separately. Where replicates are impossible, as with volatile organics, duplicates must be taken.

- Trip Blanks – trip blanks are samples that originate from analyte-free water taken from the laboratory to the sampling location and returned to the laboratory with the volatile organic samples. One trip blank should accompany each cooler containing VOAs; it should be stored at the laboratory with the samples, and analyzed with the sample set. Trip blanks are only analyzed for VOAs.

1.3 DATA QUALITY OBJECTIVES

1.3.1 Overall Data Quality Objectives

Data Quality Objectives (DQO) are quantitative and qualitative statements specifying the quality of the environmental data required to support the decision-making process that guide the site investigation and any subsequent corrective actions. DQO define the total uncertainty in the data that is acceptable for each specific activity during the investigation. This uncertainty includes both sampling error and analytical error. Ideally, the prospect of zero uncertainty is the objective; however, the very process by which data is collected in the field and analyzed in the laboratory contributes to the uncertainty of the data. It is the overall objective to keep the total uncertainty to a minimal level such that it will not hinder the intended use of the data.

In order to achieve the project DQO, specific data quality requirements such as detection limits, criteria for accuracy and precision, sample representativeness, data comparability and data completeness must be specified. The overall objectives and requirements are established such that there is a high degree of confidence in the measurements.

The parameters that will be used to specify data quality requirements and to evaluate the analytical system performance for soil, sediment, surface water, and ground water samples are precision, accuracy, representativeness, completeness and comparability (PARCC).

1.3.2 *Field Investigation Quality Objectives*

The objective of the field sampling program with respect to soil, vapor, and groundwater sampling is to maximize the confidence in the data in terms of PARCC.

To allow calculation of precision and accuracy for the groundwater samples, duplicates, trip blanks, and field blanks will be collected.

Precision will be calculated as RPD if there are only two analytical points. Percent relative standard de1viation (% RSD) will be used to calculate precision if there are more than two analytical points. The submission of field blanks will provide a check with respect to accuracy. The submission of blanks will monitor chemicals that may be introduced during sampling, preservation, handling, shipping and/or the analytical process. The data quality objective for field blanks for soil samples is to meet or exceed the New York State Department of Environmental Conservation (NYSDEC) Analytical Services Protocol (ASP) Target Compound List/Target Analyte List (TCL/TAL) Contract Required Quantitation Limits (CRQLs). In the event that the blanks are contaminated and/or poor precision is obtained, the associated data will be appropriately qualified. Through the submission of field QC samples, the distinction can be made between laboratory problems, sampling technique considerations, sample matrix effects, and laboratory artifacts.

1.3.3 *Laboratory Data Quality Objectives*

All samples collected from the site will be submitted to a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP) certified analytical laboratory at the

Contract Laboratory Protocol (CLP) level meeting requirements for documentation, data reduction and reporting.

The laboratory will demonstrate analytical precision and accuracy by the analysis of various QC samples (i.e., laboratory duplicates, spike samples, matrix spike duplicates and laboratory control samples). Precision, as well as instrument stability, will also be demonstrated by comparison of calibration response factors from the initial calibration to that of the continuing calibrations. Laboratory accuracy will be evaluated by the addition of surrogate and matrix spikes compounds, and will be presented as percent recovery. Precision will be presented as RPD, % RSD, or percent difference (%D), whichever is appropriate for the number and type of QC samples analyzed. Laboratory blanks can also be used to demonstrate the accuracy of the analyses and possible effects from laboratory artifact contamination.

2.0 PROJECT STAFFING

All personnel involved in an investigation and in the generation of data are implicitly a part of the overall project and quality assurance program. In addition, certain individuals have specifically delegated responsibilities. Persons with specific QA/QC roles during these additional investigations are the Project Manager (PM), the Field Team Leader (FTL) and the QA/QC Officer. In the following sections, the roles and responsibilities of essential personnel are identified.

Project Manager:	Mitchell L. Moss
QA/QC Officer:	Douglas J. Newton
Field Team Leader:	William M. Bezts

2.1 PROJECT MANAGER

The PM will be responsible for scheduling, communicating, technical review of field activities and the overall quality of the project and project deliverables. The PM should have experience in the management and coordination of multi-disciplinary field investigation projects.

2.2 QA/QC OFFICER

The QA/QC Officer will have overall responsibility for QA/QC review of all analytical data generated during the field investigation; data

validation and qualification of analytical results in terms of data usability. The QA/QC Officer should be experienced in the evaluation of analytical data and the protocols and QC requirements of the analytical methods listed in the NYSDEC ASP.

2.3 FIELD TEAM LEADER

The FTL will report to the PM and will be responsible for the day to day management and coordination of field staff. The FTL will be responsible for the quality of the field activities and will be experienced in field investigation projects.

3.0 FIELD QUALITY ASSURANCE/QUALITY CONTROL

3.1 EQUIPMENT MAINTENANCE

In addition to the laboratory analyses, field measurements will be collected for pH, flow rate, and turbidity. A maintenance, calibration, and operation program will be implemented to ensure that routine calibration and maintenance is performed on all field instruments. The program will be administered by the QA/QC Officer and the field team members.

Daily maintenance, calibration and equipment operation will follow the procedures outlined in the manufacturers Operation and Field Manuals accompanying the respective instruments.

3.2 EQUIPMENT CALIBRATION

Field team members will be familiar with the field calibration, operation, and maintenance of the equipment. They will perform field calibrations, checks, and instrument maintenance daily. A trained team member will perform daily field checks and instrument maintenance prior to use of all filed instruments. The pH, flow rate and turbidity meters will be calibrated by a trained team member using standard calibration solutions and methods. Field maintenance, calibration and equipment operation will follow the procedures outlined in the manufacturer's Operation and Field Manuals accompanying the respective instruments. All maintenance

and calibration shall be documented on an instrument-specific master calibration/maintenance form.

The FTL or a designee shall be responsible for keeping a master instrument calibration/maintenance form for each measuring device. Each form shall include at least the following information, where applicable.

- Name of device and/or instrument calibrated;
- Device/instrument serial and/or I.D. number;
- Frequency of calibration;
- Date of calibration;
- Results of calibration;
- Name of person performing the calibration;
- Identification of the calibration standards; and
- Buffer solutions (pH meter only).

3.3 EQUIPMENT DECONTAMINATION

In order to minimize the potential for cross-contamination, all sampling equipment shall be properly decontaminated prior to and after each use.

3.3.1 General Procedures

Sampling equipment and probes will be decontaminated in an area covered by plastic near the sampling location. All solvents and wash water used in the decontamination process will be collected and

drummed for off-site disposal. All disposable sampling equipment will be properly disposed of in dry containers.

Extraneous contamination and cross-contamination shall be controlled by wrapping the sampling equipment with aluminum foil when not in use and changing and disposing of the sampler's gloves between samples. Decontamination of sampling equipment shall be kept to a minimum in the field, and wherever possible, dedicated sampling equipment shall be used. Personnel directly involved in equipment decontamination shall wear appropriate protective equipment.

3.3.2 *Non-Aqueous Sampling Equipment (trowels, knives, split-spoons, bowls, bailers, etc.)*

All non-aqueous sampling equipment will be decontaminated before each use as follows:

- Laboratory-grade glassware detergent and tap water scrub to remove visual contamination;
- Generous tap water rinse; and
- Distilled and deionized (ASTM Type II) water rinse.

3.3.3 *Aqueous Sampling Equipment*

New disposable Teflon bailers will be used during the investigation. Accordingly, field decontamination of the bailers will not be required. However, in the event that field decontamination is required, decontamination procedures will be as follows:

- Laboratory-grade glassware detergent and tap water scrub to remove visual contamination;
- Generous tap water rinse;
- Distilled and deionized (ASTM Type II) water rinse;
- Dilute nitric acid rinse, followed by a distilled and deionized water rinse (metals only), or
- Methanol (pesticide grade) rinse (volatiles only);
- Total air dry; and
- Distilled and deionized water rinse.

3.3.4 Meters and Probes

All meters and probes that are used in the field (other than those used solely for air monitoring purposes, e.g., oxygen meters, explosimeters, etc.) will be decontaminated between use as follows:

- Phosphate-free laboratory detergent solution;
- Tap water;
- Deionized water (triple rinse).

3.4 FIELD RECORDS

Proper management and documentation of field activities is essential to conducting work in accordance with the SAP, and QAPP. Field management procedures include following proper chain of custody procedures to track a sample from collection through analysis, noting when and how samples are split (if required), making regular and complete entries in the field logbook, and the consistent use and

completion of field management forms. It is a requirement that the field management forms and field logbook be used to document all field activities, as this documentation will support that the samples were collected and handled properly making the resultant data complete, comparable and defensible. Field logbook procedures and field management forms are identified in the following sections.

Field Logbook

The sample team or individual performing a particular sampling activity shall be required to keep a weather proof field notebook. Field notebooks are intended to provide sufficient data and observations to enable participants to reconstruct events that occurred during projects and to refresh the memory of the field personnel if called upon to give testimony during legal proceedings. In a legal proceeding, notes, if referred to, are subject to cross-examination and are admissible as evidence. The field notebook entries should be factual, detailed, and objective. All entries are to be signed and dated. All members of the field investigation team are to use this notebook, which shall be kept as a permanent record. The field notebook shall be filled out at the location of sample collection immediately after sampling. It shall contain sample descriptions including: sample number, sample collection time, sample location, sample description, sampling method used, daily weather conditions, field measurements, name of sampler, and other site-specific observations. The field notebook shall contain any deviations from protocol and why, visitor's names, or community contacts made during sampling, geologic and other site-specific information which may be noteworthy.

Field Management Forms

In addition to the maintenance of a field logbook, the use of field management forms shall be required to supplement field logbook entries for all field activities. Field management forms provide a regular format to record the required information for a particular field activity. Use of these forms will ensure that the field team consistently and completely records all pertinent data relative to a particular field activity on a regular basis. All forms, sample labels, custody seals and other sample documents shall be filled out completely. A list of forms and the associated activities for which each form is to be completed is presented below.

Form	Activity
Daily Field Report	Every day of field activity
Daily Instrument Calibration Log	Every day a field instrument is used
Sampling Equipment Checklist	All field sampling efforts
Laboratory Sample Bottle Request	All field sampling efforts
Chain of Custody Form	All field sampling efforts
Status of Laboratory Sample Data (Master Log)	All field sampling efforts

Copies of each of these forms will be provided.

4.0 SAMPLE COLLECTION

4.1 SYNOPTIC GROUNDWATER MEASUREMENTS

The following procedures will be used for measuring water levels:

1. Previous depth to water measurements and measuring point elevations will be reviewed and records taken into the field for comparative purposes.

2. Depth to water measurements will be obtained with an electronic probe from the measuring point in each well. The measuring point consists of a notch or mark at the top of the inner casing.

3. An electric water-level probe will be lowered slowly into the well until contact with the water surface is indicated by an electronic signal.

4. The cable will be marked or held at the measuring point. A tape calibrated in hundredths of a foot will be used to measure the distance from the mark to the nearest depth marking on the cable.

5. Measurements will be repeated until two consecutive readings are obtained that agree within +0.02 foot. Water-level elevations will be obtained by subtracting the depth to water measurement from the measuring point elevation. The total depth of each well will also be sounded with a weighted tape.

6. The portion of the water-level probe which has been in contact with the well water will be cleaned in detergent and water and rinsed in tap water prior to use at each well.

4.2 WELL PURGING AND COLLECTION OF FIELD PARAMETERS

1. Decontaminated centrifugal pumps with new polyethylene, disposable tubing will be used for purging groundwater from the wells.

2. To avoid cross-contamination, the wells will be sampled from cleanest to most contaminated based on previous sampling results.

3. The wells will be purged three well volumes, taking care not purge a well dry.

4. A record of purging and groundwater sampling will be kept for each well. The water sampling log will include the following information: well number, date and time of purge, purging method, well depth (from sounding), volume of water evacuated from the well, description of the water produced, post purge water level, and records of field analytical measurements.

5. Purged groundwater will be containerized for proper disposal.

4.3 GROUNDWATER SAMPLING PROCEDURES

1. To avoid cross-contamination, the wells will be sampled from cleanest to most contaminated based on previous sampling results.

2. A decontaminated sample jar will be filled with a sample of groundwater for pH testing. The pH probe will be inserted into the jar and allowed to stabilize before recording a reading.

3. Groundwater samples will be collected in laboratory provided decontaminated sample bottles. All bottles will be filled completely with no remaining headspace in the bottle.

4. Samples for metals will be field-filtered at the wellhead using a 0.45-micron, inert filter. In-line filters will be connected directly to the pump discharge tubing. Preservation of the samples will follow the filtering.

5. If NYSDEC or its oversight contractors require split-samples, MACTEC personnel will perform the sampling, filtering and filling of containers. With the exception of samples collected for analysis of volatile constituents (including the dissolved gases), homogenization of aqueous samples will only be performed if heterogeneity is suspected (for example sporadic turbidity is evident in the sample). When homogenization is required, water

will be accumulated in decontaminated, glass containers and aliquots dispensed to the split set of bottleware.

6. Trip blanks and field blanks will be collected at the frequency outlined in Section 5.0 (Field QA/QC Blanks).

7. Chain of custody documentation will be prepared at the end of each sampling event and included in the packaged samples.

4.4 AIR SAMPLE COLLECTION

Air samples will be collected in laboratory supplied summa canisters as follows:

1. To avoid cross-contamination, the sampling points will be sampled from cleanest to most contaminated based on previous sampling results.

2. The sample canisters should be cleaned and tested by the laboratory in accordance with method approved canister preparation procedures.

3. The air to be sampled will be screened with a portable photoionization detector for the total VOC concentration and recorded.

4. Securely attach the vacuum gauge to the summa canister, open the flow valve, and record the evacuated vacuum of the summa canister on the chain of custody and canister label. Close the flow valve securely prior to removing the vacuum gauge.

5. Using new polyethylene tubing, as well as a new air particulate filter and tubing compression fittings provided by the laboratory, securely attach the summa canister to the sampling port.

6. Open the flow valve and allow the vapor to be sampled to enter the summa canister. When "hissing" sound stops, close the flow valve securely.

7. Remove the polyethylene tubing assembly and reattach the vacuum gauge as in Step 4. Open the flow valve and record the evacuated vacuum of the summa canister on the chain of

custody and canister label. Close the flow valve securely prior to removing the vacuum gauge.

4.5 SAMPLE COLLECTION FREQUENCY

The frequency of air and groundwater sample collection is provided in Section 5.0 of the Remedial Investigation and Remedial Action Workplan

The quantity of Field QA/QC sample blanks to be collected is summarized in Section 6.0 of this plan.

5.0 SAMPLE PREPARATION AND CUSTODY

5.1 SAMPLE IDENTIFICATION

In order to provide for proper identification in the field and proper tracking in the laboratory, all samples must be labeled in a clear and consistent fashion using the procedures and protocols described below and within the following subsections.

Sample labels will be waterproof and have a pre-assigned, unique number that is indelible.

Field personnel must maintain a field notebook. This notebook must be water resistant with sequentially numbered pages. Field activities shall be sequentially recorded in the notebook.

The notebook, along with the chain-of-custody form, must contain sufficient information to allow reconstruction of the sample collection and handling procedure at a later time.

Each sample shall have a corresponding notebook entry which includes:

- Sample ID number
- Sample point location and number
- Date and time
- Analysis for which sample was collected
- Additional comments as necessary

Samplers' name or initials

Each sample must have a corresponding entry on a chain-of-custody manifest.

The manifest entry for sampling is to be completed before sampling is initiated at any other well by the same sampling team.

In cases where the samples leave the immediate control of the sampling team (i.e., shipment via common carrier) the shipping container must be properly sealed.

Each sample collected shall be designated by a code that shall identify the type of sampling location, the specific location, the matrix sampled, and a specific sample designation (identifier).

5.2 SAMPLE CONTAINERS

The analytical laboratory shall provide all necessary sample containers with preservatives.

If glass bottles are used, extra glass bottles will be obtained from the laboratory to allow for accidental breakage that may occur.

If sample preservation is required, the necessary preservatives will be placed in the sample bottles by the laboratory.

The sample bottles will be handled carefully so that any preservatives are not inadvertently spilled.

5.3 SAMPLE PRESERVATION

5.3.1 Sample Preservation

Soil samples collected during the sampling program will be preserved cooling to 4 degrees Celsius (°C) and maintained at this temperature until time of analysis.

Immediately following collection of the samples, they shall be placed in a cooler with wet ice in order to maintain sample integrity. All volatile sample bottles to be filled to capacity with no headspace for volatilization. If necessary to meet a maximum recommended holding time, the samples are to be shipped by overnight courier to the laboratory.

The shipping container used will be designed to prevent breakage, spills and contamination of the samples. Tight packing material is to be provided around each sample container and any void around the wet ice. The container is to be securely sealed, clearly labeled, and accompanied by a chain-of-custody record. Separate shipping containers should be used for "clean" and samples suspected of being heavily contaminated. Care should be taken to prevent samples from freezing.

5.3.2 Sample Holding Time

All samples shall be shipped the same day they are obtained to the analytical laboratory.

The samples must be stored at or near 4°C and analyzed within applicable holding times.

The laboratory shall be a NYSDOH ELAP CLP certified laboratory, and conform to meeting requirements for documentation, data reduction and reporting. The laboratory shall follow all requirements pertaining to sample holding times contained in the NYSDEC ASP (revised 1995) and/or as prescribed by the specific analytical method.

5.4 SAMPLE CUSTODY

5.4.1 Chain of Custody

The primary objective of the sample custody procedures is to create an accurate written record that can be used to trace the possession and handling of all samples from the moment of their collection, through analysis, until their final disposition. All field sampling personnel shall adhere to proper sample custody procedures because samples collected during an investigation could be used as evidence in litigation. Therefore, possession of the samples must be traceable from the time each sample is collected until it is analyzed at the laboratory.

5.4.2 Custody Transfer to Field Personnel

The FTL or designee shall maintain custody of samples collected during this investigation. All field personnel are responsible for documenting each sample transfer and maintaining custody of all samples until they are shipped to the laboratory. Chain-of-Custody records will be completed at the time of sample collection and will

accompany the samples inside the cooler for shipment to the selected laboratory.

The Chain-of-Custody Record will be signed by each individual who has the samples in their possession. Preparation of the Chain-of-Custody Record is as follows:

For every sample, the Chain-of-Custody Record will be initiated in the field by the person collecting the sample. Every sample shall be assigned a unique identification number that is entered on the Chain-of-Custody Record.

The record will be completed in the field to indicate project, sampling team, etc.

If the person collecting the sample does not transport the samples to the laboratory or deliver the sample containers for shipment, the first block for Relinquished By _____, Received By _____ will be completed in the field.

The person transporting the samples to the laboratory or delivering them for shipment will sign and date the record form as Relinquished By _____.

If the samples are shipped to the laboratory by commercial carrier, the original Chain-of-Custody Record will be sealed in a watertight container, possibly a zipper bag, and placed in the shipping container that will be sealed prior to being given to the carrier. The carbon-less copy of the Chain-of-Custody Record will be maintained in the field file.

If the samples are directly transported to the laboratory, the chain-of-custody will be kept in possession of the person delivering the samples.

For samples shipped by commercial carrier, the waybill will serve as an extension of the Chain-of-Custody Record between the final field custodian and the laboratory.

Upon receipt in the laboratory, the Sample Custodian or designated representative, shall open the shipping containers, compare the contents with the Chain-of-Custody Record, and sign and date the record. Any discrepancies will be noted on the Chain-of-Custody Record.

If discrepancies occur, the samples in question will be segregated from normal sample storage and the FTL immediately notified.

Chain-of-Custody Records will be maintained with the records for a specific project, becoming part of the data package.

5.4.3 Custody Transfer to Laboratory

All samples collected will be submitted to a NYSDOH ELAP CLP certified laboratory meeting requirements for documentation, sample login, internal chain of custody procedures, sample/analysis tracking, data reduction and reporting. The laboratory shall follow all requirements pertaining to laboratory sample custody procedures contained in the NYSDEC ASP (revised 1995).

In general, the following procedures will be followed upon sample receipt. The laboratory shall not accept samples collected by project

personnel for analysis without a correctly prepared Chain-of-Custody Record.

The first steps in the laboratory receipt of samples are completing the Chain-of-Custody Records and project sample log-in form. The laboratory Sample Custodian, or designee, will note that the shipment is accepted and notify the Laboratory Manager or the designated representative of the incoming samples.

Upon sample receipt, the laboratory Sample Custodian, or designee, will:

- Examine all samples and determine if proper temperature has been maintained during shipment. If samples have been damaged during shipment, the remaining samples will be carefully examined to determine whether they were affected. Any samples affected shall also be considered damaged. It will be noted on the Chain-of-Custody Record that specific samples were damaged and that the samples were removed from the sampling program. Field personnel will be notified as soon as possible that samples were damaged and that they must be resampled, or the testing program changed, and provide an explanation of the cause of damage.

- Compare samples received against those listed on the Chain-of-Custody Record.

- Verify that sample holding times have not been exceeded.

- Sign and date the Chain-of-Custody Record and attach the waybill to the Chain-of-Custody Record.

- Denote the samples in the laboratory sample log-in book which contains the following information:

  - Project identification number
  - Sample numbers
  - Type of samples
  - Date received in laboratory

- Record of the verified time of sample receipt (VTSR)
- Date put into storage after analysis is completed
- Date of disposal.

The last two items will be added to the log when the action is taken.

- Notify the Laboratory Manager of sample arrival.
- Place the completed Chain-of-Custody Records in the project file.

The VTSR is the time of sample receipt at the laboratory. The date and time the samples are logged in by the Sample Custodian or designee will agree with the date and time recorded by the person relinquishing the samples.

5.5 SAMPLING PACKAGING AND SHIPPING

Sample bottles and samples shall either be delivered/picked up daily by the analytical laboratory, or delivered/shipped via overnight courier. Once the samples have been collected, proper procedures for packaging and shipping shall be followed as described below.

5.5.1 Packaging

Prior to shipment, samples must be packaged in accordance with current United States Department of Transportation (USDOT) regulations. All required government and commercial carrier shipping papers must be filled out. The procedure below should be followed regardless of transport method:

- Samples will be transported in metal ice chests or sturdy plastic coolers (cardboard or Styrofoam containers are unacceptable).

- Remove previously used labels, tape and postage from cooler.
- Ship filled sample bottles in same cooler in which empty bottles were received.
- Affix a return address label to the cooler.
- Check that all sample bottles are tightly capped.
- Check that all bottle labels are complete.
- Be sure chain-of-custody forms are complete.
- Wrap sample bottles in bubble pack and place in cooler.
- Pack bottles with extra bubble pack, vermiculite, or Styrofoam "peanuts". Be sure to pack trip blank, if applicable.
- Keep samples refrigerated in cooler with bagged ice. Do not use ice for packing material; melting will cause bottle contact and possible breakage.
- Separate and retain the sampler's copy of chain-of-custody and keep with field notes.
- Tape paperwork (chain-of-custody, manifest, return address) in zipper bag to inside cooler lid.
- Close cooler and apply signed and dated custody seal in such a way that the seal must be broken to open cooler.
- Securely close cooler lid with packing or duct tape. Be sure to tape latches and drain plugs in closed position.

5.5.2 *SHIPPING*

Samples should arrive at the lab as soon as possible following sample collection to ensure holding times are not exceeded. All samples must be hand delivered on the same day as sampling or

sent via overnight courier. When using a commercial carrier, follow the steps below.

- Securely package samples and complete paperwork.
- Weigh coolers for air transport.
- Complete air bill for commercial carrier (air bills can be partially completed in office prior to sampling to avoid omissions in field). If necessary, insure packages.
- Keep customer copy of air bill with field notes and chain-of-custody form.
- When coolers have been released to transporter, call receiving laboratory and give information regarding samplers' names, method of arrival.
- Call the lab on day following shipment to be sure all samples arrived intact. If bottles are broken, locations can be determined from chain-of-custody and resampled.

6.0 FIELD QA/QC BLANKS

General guidance and the specific requirements regarding the collection of QA/QC samples are presented separately below.

6.1 TRIP BLANKS

A laboratory-supplied trip blank shall be an aliquot of distilled, deionized water, which shall be sealed in a sample bottle prior to initiation of each day of fieldwork. The trip blank shall be used to determine if any cross-contamination occurs between aqueous samples during shipment. Trip blanks are analyzed for aqueous VOCs only. Glass vials (40 ml) with Teflon-lined lids shall be used for VOC blanks. A trip blank shall be prepared by the laboratory prior to each day of field sampling for aqueous volatiles. The sealed trip blank bottles shall be placed in a cooler with the empty sample bottles and shall be brought to the property by the laboratory personnel. If multiple coolers are required to store and transport aqueous VOC samples, then each cooler must contain an individual trip blank.

6.2 FIELD BLANKS

Field blanks shall be collected to evaluate the cleanliness of sampling equipment, sample bottles and the potential for cross-contamination of samples due to handling of equipment and sample bottles, and contaminants present in ambient air. Field blank samples shall be performed on the sample bailers and/or soil

sampler. The frequency of field blanks taken shall be one per decontamination event for each type of sampling equipment, and each media being sampled (e.g., a ground water bailer for ground water, and a split-spoon for soil sampling), at a minimum of one per equipment type and/or media per day.

Where required, field blanks shall be obtained prior to the occurrence of any analytical field sampling event by pouring deionized or potable water over a particular piece of sampling equipment and into a sample container. The analytical laboratory shall provide field blank water and sample jars with preservatives for the collection of all field blanks. Glass jars shall be used for organic blanks. Polyethylene or glass containers shall be used for inorganic blanks. The field blanks as well as the trip blanks shall accompany field personnel to the sampling location. The field blanks shall be analyzed for the same analytes as the environmental samples being collected that day and shall be shipped with the samples taken subsequently that day.

Field blanks shall be taken in accordance with the procedure described below:

- Decontaminate sampler using the procedures specified in this plan.
- Pour distilled/deionized water over the sampling equipment and collect the rinsate water in the appropriate sample bottles.
- The sample shall be immediately placed in a sample cooler and maintained at a temperature of 4°C until receipt by the laboratory.
- Fill out sample log, labels and chain-of-custody forms, and record in field notebook.

7.0 ANALYTICAL LABORATORY

7.1 ANALYTICAL METHODS

All samples will be submitted to a NYSDOH ELAP CLP certified laboratory meeting requirements for documentation, data reduction and reporting.

The data collected during the course of the investigation will be used to determine the presence and concentration of certain compounds and analytes in soil, vapor, and groundwater at specific locations described in the Work Plan. Samples of soil, vapor and groundwater will be collected and analyzed for some or all of the constituents listed below as outlined in the Work Plan.

Samples of soil, vapor and groundwater analytical results can be used to qualitatively determine the presence or absence of these constituents at sampled locations and to quantitatively determine the concentration of these constituents at specific areas.

7.2 INSTRUMENT CALIBRATION

The laboratory calibration procedures and frequency for the required analytical methods to be followed by the selected laboratory are specified in the NYSDEC ASP Analytical Method Procedures (10/95) and the individual USEPA SW-846 analytical method procedures. The selected laboratory's calibration schedule will adhere to all analytical method requirements.

7.3 LABORATORY QA/QC

7.3.1 Duplicate Samples

Duplicate samples shall be analyzed to check laboratory reproducibility of analytical data. At least 5% (one out of every 20 samples) of the total number of collected samples shall be duplicated to evaluate the precision of the methods used. All duplicate samples shall be submitted to the analytical laboratory as a "blind duplicate", having a fictitious sample identification name and time of sample collection. Each blind duplicate shall be cross-referenced to document in the field notes and on the master sample log to record which real sample it is a duplicate of.

7.3.2 Matrix Spike/Matrix Spike Duplicate

Matrix spike/matrix spike duplicates for organic and inorganic analysis are performed at a predetermined frequency according to the appropriate analytical method. Further, re-analyses are required at times, due to determination of anomalous results during analysis. To ensure the laboratory has sufficient volume for matrix spike/matrix spike duplicate (MS/MSD) analysis, triple sample volume shall be submitted for samples once per every 20 samples in a sample delivery group (SDG).

8.0 DATA EVALUATION

8.1 FIELD DATA

Field data generated in accordance with the project-specific Work Plan will consist in part of pH, dissolved oxygen, REDOX and specific conductance. These data will be evaluated by reviewing project documentation to check that all forms specified in the SAP and this QAPP have been completely and correctly filled out and that documentation exists for the required instrument calibration. This documentation will be considered sufficient to provide that proper procedures have been followed during the field investigation.

8.2 LABORATORY DATA

The QA/QC officer will prepare a Data Usability Summary Report (DUSR) in order to evaluate the analytical data generated on this project. The DUSR will be prepared in accordance with NYSDEC guidelines.

9.0 REPORTING

9.1 FIELD DATA

The proper management and documentation of field activities is essential to ensure that all necessary work is conducted in accordance with the SAP, and QAPP in an efficient manner. Field data will be recorded and reported by field personnel through the use of the field logbook, field management forms and chain of custody forms described in the preceding sections.

Field management procedures include following proper chain of custody procedures to track a sample from collection through analysis, noting when and how samples are split (if required), making regular and complete entries in the field logbook, and consistently using and completing field management forms. Proper completion of these forms and the field logbook are necessary to support the consequent actions that may result from the sample analysis. This documentation will support that the samples were collected and handled properly, making the resultant data complete, comparable and defensible.

9.2 LABORATORY DATA

The analytical results of all samples collected shall be reported following 1995 NYSDEC ASP (Rev-95) requirements. All laboratory analytical data generated as a result of all NYSDEC ASP analytical methods will be reported as ASP CLP data deliverables, and

NYSDEC Category B deliverables for all other analytical methods. The deliverables include all backup QA/QC documentation necessary to facilitate an evaluation of the data.

9.3 CORRECTIVE ACTIONS

The QA/QC program contained in this QAPP will enable problems to be identified, controlled, and corrected. Potential problems may involve non-conformance with the SOPs and/or analytical procedures established for the project, or other unforeseen difficulties. Any persons identifying an unacceptable condition will notify the project manager. The project manager will be responsible for developing and initiating appropriate corrective action and verifying that the corrective action has been effective.

The NYSDOH ELAP CLP certified laboratory utilized for this project should meet the requirements for corrective action protocols. Laboratory corrective action may include instrumentation maintenance, methods modification, cross contamination/carry over issues, sample tracking practices, laboratory information management (LIMs), etc.